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**Self-reported competence of Estonian community pharmacists in relation to herbal products: findings from a health-system in transition**

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## INTRODUCTION

Complementary and alternative medicine (CAM) has been defined as a group of diverse medical and health care systems, practices, and products that are not generally considered part of conventional medicine (Barnes, 2003). Herbal products are one component of CAM, and include both herbal supplements and herbal medications. Herbal supplements, used by some individuals to supplement traditional medical therapies, are not considered as medications and in general are not regulated by drug agencies (Definition of herbal supplement, 2009). Herbal medications have active constituents with known pharmacological effects and they are able to cause side effects and interactions. Herbal medications are usually dispensed by retail pharmacies without prescription and are often regulated as medicinal products (Holst *et al.*, 2009).

The 2007 National Health Interview survey conducted in the US revealed that 74% of adults and 53% of children had used herbal supplements in the past 30 days (National Health Interview Survey, 2007). A similar increase in the use of CAM has been reported in European countries (Thomas *et al.*, 2001).

In Europe legislation concerning herbal medications was not harmonized until 2001. Prior to European harmonization each country was responsible for its own regulations concerning herbal medicines. In Germany, the therapeutic guide to herbal medicine issued in 1998 contained descriptions of 380 medicinal plants (The Complete German Commission E Monographs, 1999). Requirements for obtaining a marketing authorisation for traditional herbal medicinal products were first presented in the EU

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3 Directive 2001/83/EC. This directive was later replaced with Directive 2003/63/EC  
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5 (Commission Directive 2003/63/EC amending Directive 2001/83/EC, 2003).  
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### 10 ***Healthcare reforms in Estonia***

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12 Estonia is a small northern European country (population 1.3 million) located to the south  
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14 of Finland. Unlike in many European and North American countries there is a long  
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16 tradition of herbal product use in Estonia. However, the traditions associated with herbal  
17  
18 product use are evolving in line with the recent healthcare reforms. Since independence  
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20 from Soviet Union was restored in 1991 the Estonian health care system has undergone a  
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22 process of rapid transition. This transition has involved the shift from a centralized,  
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24 specialist-orientated system to a system based on primary health care and evidence-based  
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26 medicine (Põlluste *et al.*, 2005). Under these changes the operation of community  
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28 pharmacies was transferred from the State to private ownership (Volmer *et al.*, 2008).  
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31 Estonia joined the European Union (EU) in 2004. Pharmacies in Estonia continue to have  
32  
33 a monopoly on the sale of prescription and non-prescription medications, including  
34  
35 herbal products. Consumers perceive pharmacists as trustworthy sources of information  
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37 about prescription and non-prescription drugs (Volmer *et al.*, 2009). However, pharmacy  
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39 practice and policy in Estonia is increasingly shaped by reforms at the European level.  
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48 The healthcare reforms described above have created two approaches to the use of herbal  
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50 products in Estonia. The first approach is based on traditions and practice experience.  
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52 The second approach is based on evidence-based medicine and scientific research. These  
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54 approaches are not necessarily mutually exclusive. Estonian pharmacists are increasingly  
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3 required to marry these approaches to meet the healthcare needs and expectations of their  
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5 customers.  
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### 8 9 10 ***Regulation and use of herbal medications and herbal supplements in Estonia***

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12 Legislation related to herbal medicinal products in Estonia follows EU directives. The  
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14 State Agency of Medicines (SAM) is the institution responsible for categorization of  
15  
16 herbal products as medicines or supplements and for licensing of herbal medicinal  
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18 products. The categorization is made on the basis of the safety of the active components  
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20 (Medicinal Products Act, 2005). The Estonian Health Care Board is responsible for  
21  
22 registration of herbal supplements. However, detailed requirements for the quality,  
23  
24 efficacy and safety of herbal supplements have not been developed in Estonia. Currently,  
25  
26 the importer of herbal supplements must obtain a quality certificate for each herbal  
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28 product. Although both herbal medicinal products and supplements are sold in  
29  
30 community pharmacies, it is often challenging for pharmacists to access and provide  
31  
32 evidence-based information in relation to the quality, efficacy and safety of the herbal  
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34 supplements.  
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44 The use of herbal products has been traditional and popular in Estonia. In 2002 the most  
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46 popular herbal products were teas for the treatment of minor urinary and upper  
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48 respiratory tract complaints, followed by stress-relieving remedies and teas to provide a  
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50 “good night’s sleep” (Püüa, 2004). Estonians often use herbal products as the first  
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52 remedy to treat minor illnesses. Information concerning the mode of action and indication  
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3 is typically obtained from previous experience or provided by a health care professional,  
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5 usually a pharmacist (Volmer *et al.*, 2007).  
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10 The only formal education about medicinal plants and herbal products provided to  
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12 pharmacists in Estonia is during the five-year Master of Pharmacy degree program at the  
13  
14 University of Tartu (Evaluation of pharmacy training, 2001). Unlike in many other  
15  
16 European countries there are no herbalists in Estonia. In addition, there are very few  
17  
18 “health shops” in Estonia from where it is possible to purchase herbal supplements,  
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20 natural and wellness products, cosmetics and other products.  
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### 27 ***Attitudes of pharmacists towards herbal products***

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29 A systematic review of 19 studies of US and Canadian pharmacists reported both positive  
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31 and negative attitudes toward the safety and efficacy of dietary supplements (Kwan, *et*  
32  
33 *al.*, 2006). Despite the fact a large proportion of pharmacists received questions about  
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35 dietary supplements from patients and other health professionals, pharmacists perceived  
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37 their knowledge was inadequate and recognized the need for additional training. The  
38  
39 need for more training in relation to CAM has also been reported among Australian  
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41 pharmacy students (Tiralongo, *et al.*, 2008). This need may be reinforced by the  
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43 expectations of patients who consider pharmacists to be knowledgeable about natural  
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45 health products (Kwan, *et al.*, 2008). Most published studies investigating the attitudes of  
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47 pharmacists and pharmacy students toward CAM have been conducted in North America,  
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49 Asia, Australia and England (Barnes, *et al.*, 2007; Olatunde, *et al.*, in press). No previous  
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3 studies have investigated the attitudes of pharmacists toward use of herbal medications  
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5 and herbal supplements in this health system in transition.  
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10 The objectives of the study were to (1) explore the self-reported competency of  
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12 pharmacists in relation to herbal medicines and herbal supplements, and (2) investigate  
13  
14 the self-reported provision of community pharmacy services in relation to herbal  
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16 medicines and herbal supplements. In the context of the current article the herbal  
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18 medicines and herbal supplements are referred to together as herbal products.  
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## 24 **METHODS**

### 25 *Sample and data collection*

26  
27 A random sample of 50% (n=154) of community pharmacies in Estonia was extracted  
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29 from the Register of pharmacies maintained by the Estonian State Agency of Medicines  
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31 in February 2005. Each pharmacy in the sample was mailed one copy of the survey  
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33 instrument and a cover letter. The cover letter requested that the survey instrument should  
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35 be completed by the pharmacist or assistant pharmacist responsible for managing the sale  
36  
37 of non-prescription medications. All pharmacies were provided with a pre-paid addressed  
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39 envelope to return the survey instrument. A reminder was sent by e-mail to all  
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41 pharmacies after 2 weeks. All survey instruments were completed anonymously.  
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### 50 *Survey instrument*

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52 The survey instrument used in the study was adapted from an instrument previously used  
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54 to survey a stratified random sample of community pharmacists in the US (Bouldin, *et*  
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*al.*, 1999). The survey instrument included items related to (1) the respondent's demographic characteristics, (2) the frequency of consumer requests for information about herbal products, (3) the perceived importance of different determinants of herbal product use, (4) the perceived importance of different aspects of herbal product information, (5) the respondent's self-reported competency in relation to herbal products, and (6) problems encountered by the respondents in relation to proving advice about herbal products. The content validity of the survey instrument was assessed by a panel of 8 researchers and practitioners with an interest in CAM. The survey instrument was pilot tested for face validity among a convenience sample of five pharmacists. Minor changes to the wording of the items were made based on the feedback received. A copy of the survey instrument can be obtained by contacting the corresponding author.

### ***Statistical analyses***

All data analyses were performed using the Statistical Package for the Social Sciences (SPSS, Version 11.0, Chicago, IL). Differences between groups of pharmacists were compared using chi square tests for categorical variables and independent samples t-tests for continuous variables. Younger pharmacists were defined as the respondents aged 25-45 years, whereas older pharmacists were those aged 46-65 years. Urban pharmacies were defined as pharmacies located in the official cities, whereas rural pharmacies were defined as pharmacies located in the villages. Differences in pharmacists' attitudes were examined according to age and location of the pharmacy. The level of statistical significance was set at  $p \leq 0.05$ .



## RESULTS

### *Demographic characteristics of the respondents*

Of the 154 questionnaires distributed 120 (77.9%) were returned, 89 (74.1%) from city pharmacies and 31 (25.9%) from rural pharmacies. Of the respondents, 114 (95.0%) were pharmacists and 6 (5.0%) were assistant pharmacists. All of the respondents were women. The mean age  $\pm$  SD of the pharmacists was  $42.5 \pm 17.8$  years, and the mean age of the assistant pharmacists was  $39.1 \pm 15.4$  years. The pharmacists had a mean of  $17.5 \pm 14.6$  years working experience while the assistant pharmacists had a mean of  $14.5 \pm 13.8$  years working experience.

### *Professional competency of pharmacists*

Seventy-seven (64.1%) respondents self-reported their professional knowledge regarding herbal products as good or excellent. Continuing education regarding herbal products was rated as important by 35.8% of the pharmacists (n=43). Pharmacists stated that the best ways of obtaining professional knowledge were written information (n=75) 62.5% and lectures and seminars (n=75) 62.5%. Pharmacists were less likely to view visits from drug representatives (n=47) 39.1% and electronic databases (n=43) 35.8% as important sources of professional knowledge. Pharmacists would like to receive more information about unknown medicinal plants (n=83) 69.1%, safety (n=69) 57.5% and the mode of action (n=65) 54.2% of herbal products.

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3 Self-reported professional knowledge was higher among older rather than younger  
4 pharmacists ( $p=0.043$ ). Younger pharmacists were more likely to prefer electronic  
5 databases ( $p=0.027$ ) and visits from drug representatives ( $p=0.032$ ) as sources of  
6 information about herbal products. Among the respondents, 15.8% ( $n=19$ ) had  
7 experienced problems counselling about herbal products, 35.0% ( $n=42$ ) reported no  
8 problems counselling about herbal products and 49.2% ( $n=59$ ) reported they occasionally  
9 encountered problems counselling about herbal products. Of the 65.0% ( $n=78$ ) of  
10 pharmacists who indicated they encountered or occasionally encountered problems,  
11 29.5% ( $n=23$ ) said this was due to a lack of professional knowledge, 28.2% ( $n=22$ )  
12 commented on the need for more detailed patient information leaflets and 25.6% ( $n=20$ )  
13 said they encountered problems because the public misunderstood herbal products. Urban  
14 pharmacists were more critical towards the quality of patient information leaflets  
15 ( $p=0.027$ ), and the difficulty encountered when pharmacy customers lacked knowledge of  
16 herbal products ( $p=0.035$ ), than were rural pharmacists.  
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### 39 *Customer of herbal products*

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41 According to pharmacists, customers routinely came to the pharmacy for information  
42 only 45.8% ( $n=55$ ) or to ask for information and purchase herbal products 60.8% ( $n=73$ ).  
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44 According to the pharmacists, the typical customers were a 41-60 year old woman and a  
45 61 years or older man, both from the city. Respondents from urban pharmacies perceived  
46 a higher customer interest in herbal products than respondents from rural pharmacies  
47 ( $p=0.032$ ). More than half of the pharmacists surveyed considered that herbal product  
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3 advertisements in the mass media was the most common sources of information about  
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6 herbal products used by pharmacy customers (Figure 1).  
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10 Insert Figure 1 here.  
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15 Information about herbal products mode of action, administration, side effects and  
16  
17 interactions were considered most important by the survey respondents (Figure 2).  
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20 Younger pharmacists were more likely than older pharmacists to consider information  
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22 about safety as important ( $p=0.039$ ).  
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## 30 31 32 33 **DISCUSSION**

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38 This was the first study in Estonia to investigate the attitudes and knowledge of the  
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40 pharmacists towards herbal products and their consumption. The results of the study  
41  
42 provide an insight into the role of pharmacists in relation to the use of herbal products in  
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44 this health-system in transition.  
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50 Sixty four percent of the respondents self-reported that they possessed good knowledge in  
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52 relation to herbal products. This self-reported level of knowledge was higher than in  
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54 surveys of pharmacists conducted in other countries. A Finnish study reported that 38%  
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3 and 17% of pharmacy owners believed they knew sufficient information about herbal  
4 medicines and herbal supplements respectively (Fock, *et al.*, 2004). A survey of  
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6 pharmacists and attendees at series of international conferences conducted in Singapore  
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8 reported that 81% pharmacists felt they had inadequate skills and knowledge to counsel  
9  
10 patients on herbal medications (Koh, *et al.*, 2003). A survey of Australian pharmacists  
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12 reported that just 15% reporting they were "very confident" in answering queries about  
13  
14 safety, interactions or benefits of CAMs (Semple, *et al.*, 2006). This was despite an  
15  
16 earlier study finding that 91% of Australian pharmacists believe it is important to have  
17  
18 knowledge of both CAM and conventional medicine to be able to inform patients about  
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20 their treatment options (Naidu, *et al.*, 2005).  
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29 Despite high number of pharmacists self-reporting good knowledge, only 35% of  
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31 Estonian pharmacists and assistant pharmacists had not experienced any problems in  
32  
33 relation to counselling about herbal products. It is likely, therefore, that the problems  
34  
35 experienced by the pharmacists did not relate to their perceived lack of knowledge.  
36  
37 Estonian pharmacists may have had difficulty accessing evidence-based information  
38  
39 about herbal products. Of 200 herbal products available at Estonian pharmacies in 2001,  
40  
41 only 50 (25%) had written patient information leaflets (PILs) that contained no errors  
42  
43 (Arjakse, 2002). The most common error related to ascribing medical claims to products  
44  
45 classified as food supplements. Obtaining evidence-based information about CAMs is  
46  
47 also a problem reported internationally. Sources of information about CAMs among  
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49 pharmacists surveyed in Singapore included books/magazines (64%), friends/family  
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51 (35.7%), and the Internet (31.4%) (Koh, *et al.*, 2003). The most common sources of  
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3 information among Australian pharmacists were books and journal articles. This led the  
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5 authors of several studies to conclude that there is a need for greater access to CAM  
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7 resources and education (Semple, *et al.*, 2006; Olatunde, *et al.*, in press).  
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12 It is possible that Estonian pharmacists overestimated their knowledge in relation to  
13  
14 CAM and particularly concerning herbal products. While there has been a long tradition  
15  
16 of herbal product use in Estonia, recognition of the potential for clinically significant  
17  
18 herb-drug interactions is more recent (Volmer, *et al.*, 2006). However, as in previous  
19  
20 studies (Cuzzolin, *et al.*, 2009), issues concerning the safety of herbal products were  
21  
22 rarely discussed with pharmacy customers (Volmer, *et al.*, 2006). Scientific evidence  
23  
24 concerning the safety and efficacy of CAMs is typically derived from only small number  
25  
26 of randomized controlled trials (RCTs) (Hu, *et al.*, 2005). Herb-drug interactions may  
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28 have not been covered in the undergraduate pharmacy curricula when many of the  
29  
30 respondents undertook their university-based training. Pharmacy education about herbal  
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32 products in Estonia is primarily orientated to botany and the chemical constituents of  
33  
34 plants rather than the pharmacological activity of the active substances (Evaluation of  
35  
36 pharmacy training, 2001). Tools such as the 22-item Consolidated Standards of Reporting  
37  
38 Trials checklist may assist pharmacists interpreting the results of RCTs (Gagnier, *et al.*,  
39  
40 2006). However, further research is required to determine how Estonian pharmacists  
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42 communicate the risks and benefits of CAM and particularly herbal products to Estonian  
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44 pharmacy customers.  
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3 The majority of Estonian pharmacists self-evaluated their competency in relation to  
4 herbal products as good or excellent. However, there was as mismatch between  
5 pharmacists' self-evaluated competency and their self-reported provision of advice about  
6 herbal products. Health system reforms in Estonia may need to be accompanied by  
7 enhanced training for pharmacists to provide advice about the safe and appropriate use of  
8 herbal products.  
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### 22 *Study strengths and limitations*

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24 An important strength of the study was that the survey instrument was mailed to a  
25 random sample of half of all Estonian community pharmacies, and a good response rate  
26 was achieved. Estonian community pharmacists and assistant pharmacists are almost  
27 exclusively female. However, a limitation of the study was that it did not capture the  
28 attitudes of male pharmacists. In addition only 6 assistant pharmacists participated in the  
29 survey. Unlike in many other countries in Europe, the number of pharmacists working at  
30 community pharmacies is higher than the number of assistant pharmacists. Another  
31 reason for the low participation of assistant pharmacists in the survey could be incorrect  
32 following of the instructions. The envelop with the survey instrument could be opened  
33 and completed by pharmacy manager. As with other attitudinal surveys, it is not clear  
34 whether pharmacists' self-reported attitudes correspond with their actual behaviour in the  
35 pharmacy workplace. Further research is also needed to determine consumers' attitudes  
36 toward pharmacists as providers of information about CAM.  
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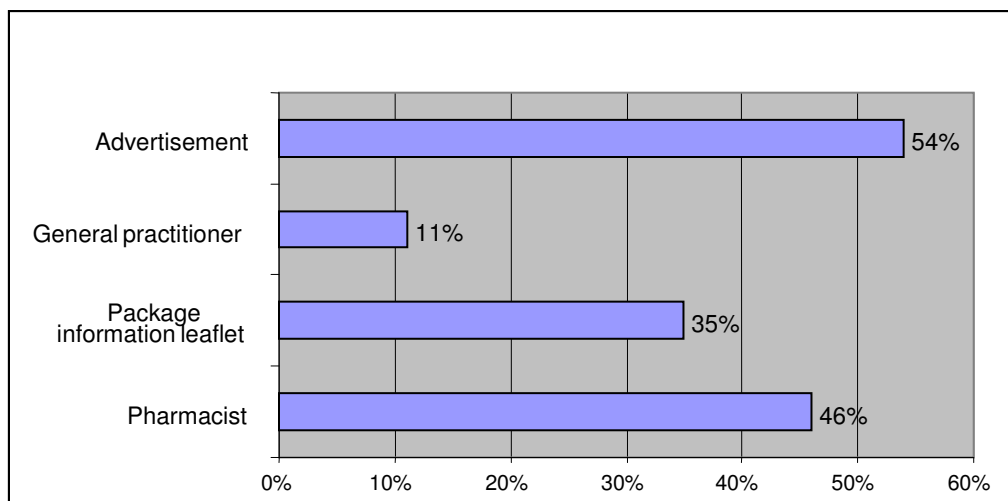


Figure 1. Information sources about herbal products used by Estonian pharmacy customers as reported by Estonian pharmacists.

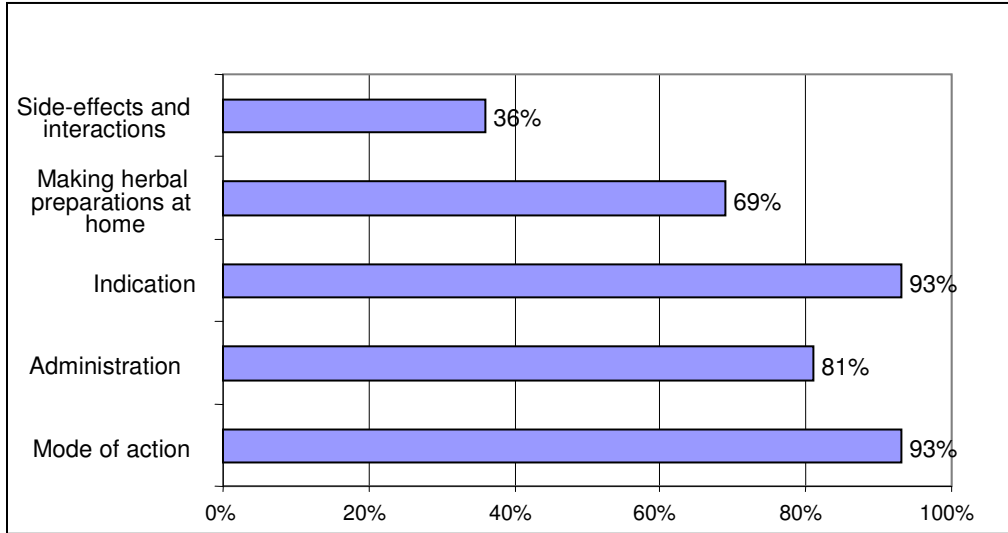


Figure 2. Importance of different types of information concerning herbal products among Estonian pharmacy customers according to the Estonian pharmacists.

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4 **Self-reported competence of Estonian community pharmacists in relation to herbal**  
5 **products: findings from a health-system in transition**  
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11 Daisy Volmer<sup>1</sup>, John Lilja<sup>2</sup>, David Hamilton<sup>3</sup>, J Simon Bell<sup>4,5</sup>, Peep Veski<sup>1</sup>  
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59 Short title: Competence of Estonian pharmacists in relation to herbal products  
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**ABSTRACT**

Recent health-system reforms in Estonia have resulted in an increased emphasis on primary health care and evidence-based medicine. Community pharmacies are the primary source of herbal products, and pharmacists have an important role in ensuring the safe and effective use of herbal products. The objective of this study was to explore the self-reported competency of pharmacists and the self-reported provision of community pharmacy services in relation to herbal products. A survey instrument was mailed to a random sample of 154 (50%) community pharmacies in Estonia in February 2005. Responses were received from 114 pharmacists and 6 assistant pharmacists (response rate 77.9%). Among the respondents, 64.1% self-evaluated their knowledge of herbal products as good or excellent. However, only 35.0% reported they experienced no problems in counselling about herbal products, while only 35.8% recognized the importance of continuing education. Pharmacists attached a high level of importance to providing of information about herbal products' mode of action, administration, potential side-effects and interactions. There was an apparent mismatch between pharmacists' self-reported competency and their self-reported provision of advice about herbal products. Health system reforms in Estonia may need to be accompanied by enhanced training for pharmacists to provide advice about the safe and appropriate use of herbal products.

**Key words:** herbal products, extended community pharmacy services, Estonia.

## INTRODUCTION

Complementary and alternative medicine (CAM) has been defined as a group of diverse medical and health care systems, practices, and products that are not generally considered as part of conventional medicine. Herbal products are one component of CAM, and include both herbal supplements sold as food supplements and herbal medications (Barnes, 2003).

Herbal medications contain active constituents with pharmacological effects and have the potential to cause adverse reactions and drug interactions. Herbal medications are usually dispensed by retail pharmacies without prescription and are often regulated as medicinal products (Holst *et al.*, 2009).

The 2007 National Health Interview survey conducted in the US revealed that 74% of adults and 53% of children had used herbal supplements in the past 30 days (2007 National Health Interview Survey). A similar increase in the use of CAM has been reported in European countries (Thomas *et al.*, 2001).

In Europe legislation concerning herbal medications was not harmonized until 2001.

Prior to European harmonization each country was responsible for its own regulations concerning herbal medications. In Germany, the therapeutic guide to herbal medication issued in 1998 contained descriptions of 380 medicinal plants (The Complete German Commission E Monographs, 1999). Requirements for obtaining a marketing authorisation for herbal medications were first presented in the EU Directive



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4 2001/83/EC. This directive was later replaced with Directive 2003/63/EC (Commission  
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6 Directive 2003/63/EC amending Directive 2001/83/EC, 2003).  
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### 10 11 ***Healthcare reforms in Estonia*** 12

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14 Estonia is a small northern European country (population 1.3 million) located to the  
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16 south of Finland. Unlike in many European and North American countries there is a  
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18 long tradition of herbal product use in Estonia. However, the traditions associated with  
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20 herbal product use are evolving in line with the recent healthcare reforms. Since  
21  
22 independence from Soviet Union was restored in 1991 the Estonian health care system  
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24 has undergone a process of rapid transition. This transition has involved the shift from  
25  
26 a centralized, specialist-orientated system to a system based on primary health care and  
27  
28 evidence-based medicine (Põlluste *et al.*, 2005). Under these changes the operation of  
29  
30 community pharmacies was transferred from the State to private ownership (Volmer *et*  
31  
32 *al.*, 2008). Estonia joined the European Union (EU) in 2004. Pharmacies in Estonia  
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34 continue to have a monopoly on the sale of prescription and non-prescription  
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36 medications, including herbal products. Consumers perceive pharmacists as trustworthy  
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38 sources of information about prescription and non-prescription drugs (Volmer *et al.*,  
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40 2009). However, pharmacy practice and policy in Estonia is increasingly shaped by  
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42 reforms at the European level.  
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52 The healthcare reforms described above have created two approaches to the use of  
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54 herbal products in Estonia. The first approach is based on traditions and practice  
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56 experience. The second approach is based on evidence-based medicine and scientific  
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58 research. These approaches are not necessarily mutually exclusive. Estonian  
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4 pharmacists are increasingly required to marry these approaches to meet the healthcare  
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6 needs and expectations of their customers.  
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### 10 11 12 13 ***Regulation and use of herbal medications and herbal supplements in Estonia***

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16 Legislation related to herbal medications in Estonia follows EU directives. The State  
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18 Agency of Medicines (SAM) is the institution responsible for categorization of herbal  
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20 products as medications or supplements and for licencing of herbal medications. The  
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22 categorization is made on the basis of the safety of the active components (Medicinal  
23  
24 Products Act, 2005). The Estonian Health Care Board is responsible for registration of  
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26 herbal supplements. However, detailed requirements for the quality, efficacy and safety  
27  
28 of herbal supplements have not been developed in Estonia. Currently, the importer of  
29  
30 herbal supplements must obtain a quality certificate for each herbal product. Although  
31  
32 both herbal medicinal products and supplements are sold in community pharmacies, it is  
33  
34 often challenging for pharmacists to access and provide evidence-based information in  
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36 relation to the quality, efficacy and safety of the herbal supplements.  
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46 The use of herbal products has been traditional and popular in Estonia. In 2002 the most  
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48 popular herbal products were teas for the treatment of minor urinary and upper  
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50 respiratory tract complaints, followed by stress-relieving remedies and teas to provide a  
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52 “good night’s sleep” (Püüa, 2004). Estonians often use herbal products as the first  
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54 remedy to treat minor illnesses. Information concerning the mode of action and  
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56 indication is typically obtained from previous experience or provided by a health care  
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58 professional, usually a pharmacist (Volmer *et al.*, 2007).  
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7 The only formal education about medicinal plants and herbal products provided to  
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9 pharmacists in Estonia is during the five-year Master of Pharmacy degree program at  
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11 the University of Tartu (Evaluation of pharmacy training, 2001). Unlike in many other  
12  
13 European countries there are no herbalists in Estonia. In addition, there are very few  
14  
15 “health shops” in Estonia from where it is possible to purchase herbal supplements,  
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17 natural and wellness products, cosmetics and other products.  
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### 20 21 22 23 *Attitudes of pharmacists towards herbal products* 24

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26 A systematic review of 19 studies of US and Canadian pharmacists reported both  
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28 positive and negative attitudes toward the safety and efficacy of dietary supplements  
29  
30 (Kwan, *et al.*, 2006). Despite the fact a large proportion of pharmacists received  
31  
32 questions about dietary supplements from patients and other health professionals,  
33  
34 pharmacists perceived their knowledge was inadequate and recognized the need for  
35  
36 additional training. The need for more training in relation to CAM has also been  
37  
38 reported among Australian pharmacy students (Tiralongo and Wallis, 2008). This need  
39  
40 may be reinforced by the expectations of patients who consider pharmacists to be  
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42 knowledgeable about natural health products (Kwan, *et al.*, 2008). Most published  
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44 studies investigating the attitudes of pharmacists and pharmacy students toward CAM  
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46 have been conducted in North America, Asia, Australia and England (Barnes and  
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48 Abbot, 2007; Olatunde, *et al.*, 2010). No previous studies have investigated the attitudes  
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50 of pharmacists toward use of herbal medications and herbal supplements in this health  
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52 system in transition.  
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4 The objectives of the study were to (1) explore the self-reported competency of  
5 pharmacists in relation to herbal medications and herbal supplements, and (2)  
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7 investigate the self-reported provision of community pharmacy services in relation to  
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9 herbal medications and herbal supplements. In the context of the current article the  
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11 herbal medications and herbal supplements are referred to together as herbal products.  
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## 18 **METHODS**

### 20 *Sample and data collection*

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23 A random sample of 50% (n=154) of community pharmacies in Estonia was extracted  
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25 from the Register of pharmacies maintained by the Estonian State Agency of Medicines  
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27 in February 2005. Each pharmacy in the sample was mailed one copy of the survey  
28  
29 instrument and a cover letter. The cover letter requested that the survey instrument  
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31 should be completed by the pharmacist or assistant pharmacist responsible for managing  
32  
33 the sale of non-prescription medications. All pharmacies were provided with a pre-paid  
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35 addressed envelope to return the survey instrument. A reminder was sent by e-mail to  
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37 all pharmacies after 2 weeks. All survey instruments were completed anonymously.  
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### 47 *Survey instrument*

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49 The survey instrument used in the study was adapted from an instrument previously  
50  
51 used to survey a stratified random sample of community pharmacists in the US  
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53 (Bouldin, *et al.*, 1999). The survey instrument included items related to (1) the  
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55 respondent's demographic characteristics, (2) the frequency of consumer requests for  
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57 information about herbal products, (3) the perceived importance of different  
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4 determinants of herbal product use, (4) the perceived importance of different aspects of  
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6 herbal product information, (5) the respondent's self-reported competency in relation to  
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8 herbal products, and (6) problems encountered by the respondents in relation to proving  
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10 advice about herbal products. The content validity of the survey instrument was  
11  
12 assessed by a panel of 8 researchers and practitioners with an interest in CAM. The  
13  
14 survey instrument was pilot tested for face validity among a convenience sample of five  
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16 pharmacists. Minor changes to the wording of the items were made based on the  
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18 feedback received. A copy of the survey instrument can be obtained by contacting the  
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20 corresponding author.  
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### 28 *Statistical analyses*

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30 All data analyses were performed using the Statistical Package for the Social Sciences  
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32 (SPSS, Version 11.0, Chicago, IL). Differences between groups of pharmacists were  
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34 compared using chi square tests for categorical variables and independent samples t-  
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36 tests for continuous variables. Younger pharmacists were defined as the respondents  
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38 aged 25-45 years, whereas older pharmacists were those aged 46-65 years. Urban  
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40 pharmacies were defined as pharmacies located in the official cities, whereas rural  
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42 pharmacies were defined as pharmacies located in the villages. Differences in  
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44 pharmacists' attitudes were examined according to age and location of the pharmacy.  
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49 The level of statistical significance was set at  $p \leq 0.05$ .  
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## 54 **RESULTS**

### 55 *Demographic characteristics of the respondents*

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4 Of the 154 questionnaires distributed 120 (77.9%) were returned, 89 (74.1%) from city  
5 pharmacies and 31 (25.9%) from rural pharmacies. Of the respondents, 114 (95.0%)  
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7 were pharmacists and 6 (5.0%) were assistant pharmacists. All of the respondents were  
8  
9 women. The mean age  $\pm$  SD of the pharmacists was  $42.5 \pm 17.8$  years, and the mean age  
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11 of the assistant pharmacists was  $39.1 \pm 15.4$  years. The pharmacists had a mean of  $17.5$   
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13  $\pm 14.6$  years working experience while the assistant pharmacists had a mean of  $14.5 \pm$   
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13.8 years working experience.

### ***Professional competency of pharmacists***

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Seventy-seven (64.1%) respondents self-reported their professional knowledge regarding herbal products as good or excellent. Continuing education regarding herbal products was rated as important by 35.8% of the pharmacists (n=43). Pharmacists stated that the best ways of obtaining professional knowledge were written information (n=75) 62.5% and lectures and seminars (n=75) 62.5%. Pharmacists were less likely to view visits from drug representatives (n=47) 39.1% and electronic databases (n=43) 35.8% as important sources of professional knowledge. Pharmacists would like to receive more information about unknown medicinal plants (n=83) 69.1%, safety (n=69) 57.5% and the mode of action (n=65) 54.2% of herbal products.

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Self-reported professional knowledge was higher among older rather than younger pharmacists (p=0.043). Younger pharmacists were more likely to prefer electronic databases (p=0.027) and visits from drug representatives (p=0.032) as sources of information about herbal products. Among the respondents, 15.8% (n=19) had experienced problems counselling about herbal products, 35.0% (n=42) reported no

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4 problems counselling about herbal products and 49.2% (n=59) reported they  
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6 occasionally encountered problems counselling about herbal products. Of the 65.0%  
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8 (n=78) of pharmacists who indicated they encountered or occasionally encountered  
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10 problems, 29.5% (n=23) said this was due to a lack of professional knowledge, 28.2%  
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12 (n=22) commented on the need for more detailed patient information leaflets and 25.6%  
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14 (n=20) said they encountered problems because the public misunderstood herbal  
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16 products. Urban pharmacists were more critical towards the quality of patient  
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18 information leaflets (p=0.027), and the difficulty encountered when pharmacy  
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20 customers lacked knowledge of herbal products (p=0.035), than were rural pharmacists.  
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### 28 *Customers of herbal products*

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30 According to pharmacists, customers routinely came to the pharmacy for information  
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32 only 45.8% (n=55) or to ask for information and purchase herbal products 60.8%  
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34 (n=73). According to the pharmacists, the typical customers were a 41-60 year old  
35  
36 woman and a 61 years or older man, both from the city. Respondents from urban  
37  
38 pharmacies perceived a higher customer interest in herbal products than respondents  
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40 from rural pharmacies (p=0.032). More than half of the pharmacists surveyed  
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42 considered that herbal product advertisements in the mass media was the most common  
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44 sources of information about herbal products used by pharmacy customers (Figure 1).  
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4 Information about herbal products mode of action, administration, side effects and  
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6 interactions were considered most important by the survey respondents (Figure 2).  
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9 Younger pharmacists were more likely than older pharmacists to consider information  
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11 about safety as important ( $p=0.039$ ).  
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## 21 22 23 **DISCUSSION** 24

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28 This was the first study in Estonia to investigate the attitudes and knowledge of the  
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30 pharmacists towards herbal products and their consumption. The results of the study  
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32 provide an insight into the role of pharmacists in relation to the use of herbal products in  
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34 this health-system in transition.  
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40 Sixty four percent of the respondents self-reported that they possessed good knowledge  
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42 in relation to herbal products. This self-reported level of knowledge was higher than in  
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44 surveys of pharmacists conducted in other countries. A Finnish study reported that 38%  
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46 and 17% of pharmacy owners believed they knew sufficient information about herbal  
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48 medications and herbal supplements respectively (Fock and Pietilä, 2004). A survey of  
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50 pharmacists and attendees at series of international conferences conducted in Singapore  
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52 reported that 81% pharmacists felt they had inadequate skills and knowledge to counsel  
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54 patients on herbal medications (Koh, *et al.*, 2003). A survey of Australian pharmacists  
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56 reported that just 15% reporting they were "very confident" in answering queries about  
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4 safety, interactions or benefits of CAMs (Semple, *et al.*, 2006). This was despite an  
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6 earlier study finding that 91% of Australian pharmacists believe it is important to have  
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8 knowledge of both CAM and conventional medicine to be able to inform patients about  
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10 their treatment options (Naidu, *et al.*, 2005).  
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16 Despite high number of pharmacists self-reporting good knowledge, only 35% of  
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18 Estonian pharmacists and assistant pharmacists had not experienced any problems in  
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20 relation to counselling about herbal products. It is likely, therefore, that the problems  
21  
22 experienced by the pharmacists did not relate to their perceived lack of knowledge.  
23  
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26 Estonian pharmacists may have had difficulty accessing evidence-based information  
27  
28 about herbal products. Of 200 herbal products available at Estonian pharmacies in 2001,  
29  
30 only 50 (25%) had written patient information leaflets (PILs) that contained no errors  
31  
32 (Arjakse, 2002). The most common error related to ascribing medical claims to products  
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34 classified as food supplements. Obtaining evidence-based information about CAMs is  
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36 also a problem reported internationally. Sources of information about CAMs among  
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38 pharmacists surveyed in Singapore included books/magazines (64%), friends/family  
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40 (35.7%), and the Internet (31.4%) (Koh, *et al.*, 2003). The most common sources of  
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42 information among Australian pharmacists were books and journal articles. This led the  
43  
44 authors of several studies to conclude that there is a need for greater access to CAM  
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46 resources and education (Semple, *et al.*, 2006; Olatunde, *et al.*, 2010).  
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54 It is possible that Estonian pharmacists overestimated their knowledge in relation to  
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56 CAM and particularly concerning herbal products. While there has been a long tradition  
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58 of herbal product use in Estonia, recognition of the potential for clinically significant  
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4 herb-drug interactions is more recent (Volmer, *et al.*, 2006). However, as in previous  
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6 studies (Cuzzolin and Benoni, 2009), issues concerning the safety of herbal products  
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8 were rarely discussed with pharmacy customers (Volmer, *et al.*, 2006). Scientific  
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10 evidence concerning the safety and efficacy of CAMs is typically derived from only  
11  
12 small number of randomized controlled trials (RCTs) (Hu, *et al.*, 2006). Herb-drug  
13  
14 interactions may have not been covered in the undergraduate pharmacy curricula when  
15  
16 many of the respondents undertook their university-based training. Pharmacy education  
17  
18 about herbal products in Estonia is primarily orientated to botany and the chemical  
19  
20 constituents of plants rather than the pharmacological activity of the active substances  
21  
22 (Evaluation of pharmacy training, 2001). Tools such as the 22-item Consolidated  
23  
24 Standards of Reporting Trials checklist may assist pharmacists interpreting the results of  
25  
26 RCTs (Gagnier, *et al.*, 2006). However, further research is required to determine how  
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28 Estonian pharmacists communicate the risks and benefits of CAM and particularly  
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30 herbal products to Estonian pharmacy customers.  
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40 Our study was conducted within the context of the Estonian health-system. This means  
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42 our findings may not be directly generalizable to other countries. However, pharmacists  
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44 in other countries with long traditions of herbal product use face similar challenges. The  
45  
46 health-systems in other Baltic and post-Soviet states have been undergoing rapid  
47  
48 transformation. There is a long-tradition of herbal product use in Germany. However,  
49  
50 unlike in Estonia, herbal products in Germany are also sold by non-pharmacist  
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52 government regulated practitioners including "Heilpraktiker" (Joos, *et al.*, 2006). The  
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54 challenge associated with combining traditional and western approaches has also been  
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56 described in Asian countries (Connett and Lee, 1994). Pharmacognosy is widely  
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4 covered within the undergraduate pharmacy degree program in Estonia. This may be  
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6 one reason why Estonian pharmacists self-evaluated their competency as good or  
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8 excellent, while the perceived lack of knowledge has been cited as a barrier to providing  
9  
10 advice about herbal products in other countries (Fock and Pietilä, 2004; Koh, *et al.*,  
11  
12 2003; Semple, *et al.*, 2006; Naidu, *et al.*, 2005). Nevertheless, health system reforms in  
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14 Estonia may need to be accompanied by enhanced training for pharmacists to provide  
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16 advice about the safe and appropriate use of herbal products.  
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### 23 ***Study strengths and limitations***

24  
25 An important strength of the study was that the survey instrument was mailed to a  
26  
27 random sample of half of all Estonian community pharmacies, and a good response rate  
28  
29 was achieved. Estonian community pharmacists and assistant pharmacists are almost  
30  
31 exclusively female. However, a limitation of the study was that it did not capture the  
32  
33 attitudes of male pharmacists. In addition only 6 assistant pharmacists participated in  
34  
35 the survey. Unlike in many other countries in Europe, the number of pharmacists  
36  
37 working at community pharmacies is higher than the number of assistant pharmacists.  
38  
39 Another reason for the low participation of assistant pharmacists in the survey could be  
40  
41 incorrect following of the instructions. The envelope with the survey instrument could  
42  
43 be opened and completed by pharmacy manager. As with other attitudinal surveys, it is  
44  
45 not clear whether pharmacists' self-reported attitudes correspond with their actual  
46  
47 behaviour in the pharmacy workplace. Further research is also needed to determine  
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49 consumers' attitudes toward pharmacists as providers of information about CAM.  
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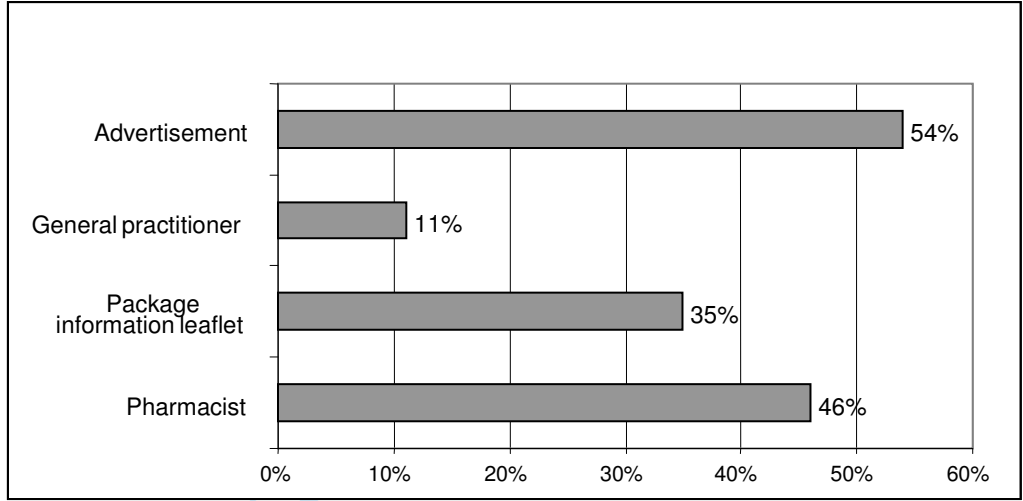


Figure 1. Information sources about herbal products used by Estonian pharmacy customers as reported by Estonian pharmacists.

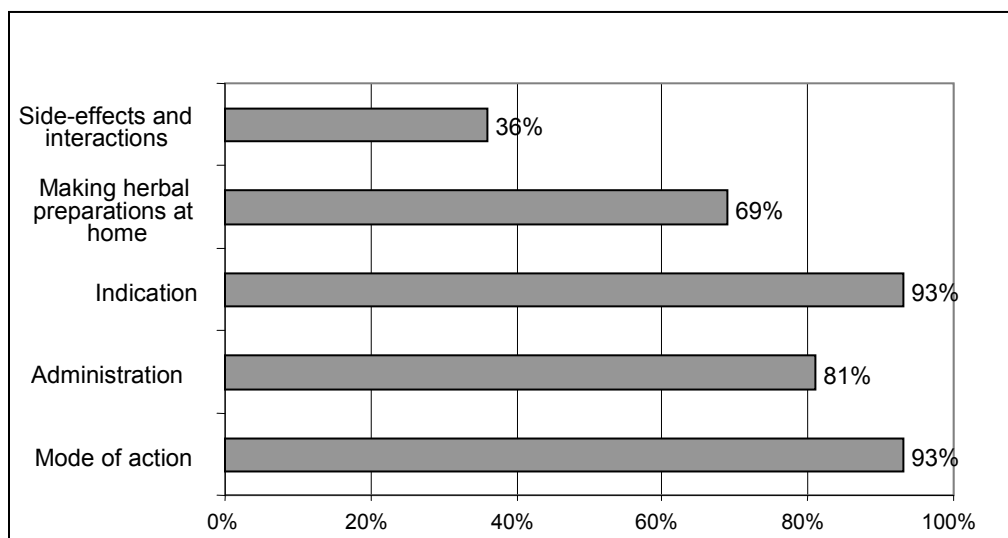


Figure 2. Importance of different types of information concerning herbal products among Estonian pharmacy customers according to the Estonian pharmacists.