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ORIGINAL REPORT

Use of herbal products among 392 Italian pregnant women: focus on pregnancy outcome[†,‡]

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ABSTRACT

Purpose The present study aimed to explore the use of herbal products among a sample of Italian pregnant women and the possible influence of herbal consumption on pregnancy outcome.

Methods The study was conducted over a 10-month period (2 days a week, from January to October 2009) at the Maternity wards of Padua and Rovereto Hospital. Data were collected through a face-to-face interview on the basis of a prestructured questionnaire including socio-demographic characteristics of the enrolled subjects, specific questions on herbal use, information about pregnancy and newborn.

Results In total, 392 interviews were considered. One hundred and nine out of 392 women (27.8%) reported to have been taking one or more herbal products during pregnancy, in the 36.7% of cases throughout all pregnancy. The most frequently herbs taken by interviewees were chamomile, licorice, fennel, aloe, valerian, echinacea, almond oil, propolis, and cranberry. Four out of 109 women (3.7%) reported side-effects: constipation after a tisane containing a mix of herbs, rash and itching after local application of aloe or almond oil. The decision to use herbal products was mainly based on personal judgement and on the conviction that these natural substances would be safer than traditional medicines. Users were more often affected by morbidities pregnancy-related and their neonates were more frequently small for their gestational age. An higher incidence of threatening miscarriages and preterm labours was observed among regular users of chamomile and licorice.

Conclusions This research underlines that the use of herbal products during pregnancy is common among Italian women, not always appropriate and in some cases potentially harmful. Copyright © 2010 John Wiley & Sons, Ltd.

KEY WORDS — herbs; pregnancy outcome; use

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INTRODUCTION

The use of herbal products during pregnancy has been studied to various extents in different countries, showing a wide range in prevalence due to cultural and regional differences. Results from studies conducted in Europe, USA and Australia indicate that between 7% and 45% of pregnant women use herbal products.[1–6] This frequent use, often on a self-treatment basis,[7] may be pregnancy-related, for example for nausea and vomiting, or related to general health conditions such as cold or skin problems. Women may choose this kind of therapy because they consider phytotherapic compounds, being natural, safer compared to conventional drugs during pregnancy[8] despite a clear evidence of negative effects exists in some cases and data on the safety of these products during pregnancy are limited.[9]

Given the knowledge gap regarding the safety of herbal intake during pregnancy, the aim of the present study was to investigate the use of herbal products

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among a sample of Italian pregnant women and the possible influence of herbal intake on pregnancy outcome.

METHODS

Study population

The study was conducted over a 10-month period (2 days a week, from January to October 2009) at the Maternity wards of two general hospitals located in Padua and Rovereto (two towns located in the north-east of Italy with 210.000 and 38.000 inhabitants, respectively). During interviews' days, 1793 deliveries occurred. Only Italian women (1255) were included in the study, while the immigrant women (about 30%) were excluded assuming that they might have different traditions in the use of herbs. In all, 420 Italian women were randomly contacted with a response rate of 95% (20 refused to participate). Therefore, 400 were interviewed within 3 days after childbirth.

All women received oral information about the study. Thereafter, written consent was obtained. The study was approved by the Padua and Rovereto Hospital Ethics Committees.

Data collection

Data were collected through a face-to-face interview carried out by a specially trained physician attending the obstetrician and gynaecological school on the basis of a prestructured questionnaire: this kind of approach was chosen on the belief that the data from an interviewer-administered questionnaire would provide more reliable and complete information than a self-administered questionnaire, the latter methodology being often associated with a lower adhesion, an inappropriate compilation and misinterpretation of the answers.[10] Each interview lasted approximately 10–15 minutes.

Interview

The questionnaire was anonymous, pretested for reliability in a small sample of subjects to ensure content validity and clarity. The instrument was further refined and the final version included basic background data of the interviewed subjects: age, marital status, number of children, level of education, occupational status, place of residence (urban or rural area). In a first session (see Appendix), 20 questions were designed to elicit information regarding: the type of herbal product consumed during pregnancy (a list was given, including products commonly sold in Italy); details on use (dosage, formulation, route of administration, frequency); timing of administration (1st, 2nd, 3rd trimester); symptom/disease and other reasons for consumption; place of purchase; relationship/communication with healthcare providers; general product knowledge in relation to quality, kind of use and risks; source of information; level of satisfaction; adverse reactions observed. In a second session, data about pregnancy history (primiparity, smoking and alcohol habits, chronic diseases, morbidities during pregnancy, medication use) and newborn (gestational age, birth weight, Apgar score, problems at birth, treatments) were both collected through the interview and abstracted from medical records by the same interviewer. In case of no herbal intake during pregnancy, only a part of the questionnaire was compiled: basic background data, questions 1, 3, 4 and 5 of the first session (see Appendix) and second session.

Statistics

Data were stored and analysed using a Delphi TM7 professional study program (database). Statistical analysis was performed using SPSS software (SPSS Inc., Chicago, IL, USA): χ^2 test was used for categorical variables. A p-value <0.05 was considered significant.

RESULTS

A total of 392 interviews were considered, because eight questionnaires were excluded due to a lack of data.

Demographic characteristics

As shown in Table 1, the study population comprised women mainly between 31 and 40 years of age, with a middle-high level of education (high school or degree) and employed. One hundred and nine out of 392 women (27.8%) reported to have been taking one or more herbal products during pregnancy: 71 (65.1%) in the 1st trimester, 74 (67.9%) in the 2nd trimester, 78 (71.6%) in the 3rd trimester, 23 (21.1%) near term (the last 15 days before the delivery). In 40 cases (36.7%), women were defined as ''regular users'', since they consumed herbs every day, throughout all pregnancy. Seventy-four women (67.9%) referred they had used herbs also before pregnancy or during previous pregnancies. Among the 283 non-users, almost all interviewees never consumed herbal products before pregnancy. However, 187 (66.1%) and 186 (65.7%) referred to consider phytomedicines potentially useful and safe.

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Table 1. Sociodemographic characteristics of women involved in the study (% in parenthesis)

	Total ($n=392$)	Users ($n=109$)	Non-users ($n=283$)	p-Value
Age (years)				
≤30	127 (32.4)	23 (21.1)	104 (36.7)	
31–40	245 (62.5)	81 (74.3)	164 (58.0)	$\chi^2=9.396$
>40	20 (5.1)	5 (4.6)	15 (5.3)	$p=0.009$
Marital status				
Single	89 (22.7)	25 (22.9)	64 (22.6)	
Married	297 (75.8)	82 (75.2)	215 (76)	NS
Separated/widow	6 (1.5)	2 (1.8)	4 (1.4)	
Level of education				
Primary school	1 (0.3)	1 (0.9)	—	
Secondary school	64 (16.3)	19 (17.4)	45 (15.9)	NS
High school	200 (51.0)	49 (45.0)	151 (53.4)	
Degree	127 (32.4)	40 (36.7)	87 (30.7)	
Employed				
Yes	339 (86.5)	96 (88.1)	243 (85.9)	
No	53 (13.5)	13 (11.9)	40 (14.1)	NS
Place of residence				
Rural area	196 (50.0)	71 (65.1)	125 (44.2)	$\chi^2=13.013$
Urban area	196 (50.0)	38 (34.9)	158 (55.8)	$p=0.001$

Compared to non-users, the age of the users was different, being women in the age group 31–40 years the most frequent users (74.3% vs. 58%, $\chi^2=9.396$, $p=0.009$). Moreover, a significant difference was found in relation to the place of residence: users lived more frequently in rural areas (65.1% vs. 44.2%, $\chi^2=13.013$, $p=0.001$).

Herbal use

In total, 204 products containing 81 different herbs were used. The most frequently reported were chamomile, licorice, fennel, aloe, valerian, echinacea, almond oil, propolis and cranberry (Table 2), some of which (chamomile, licorice and fennel) taken overall by ''regular users''. In other cases arnica, birch, lemon balm, senna, wild rose and ginger were taken. Common reasons for using these kind of therapies were symptoms/problems related to pregnancy: stretch marks and cellulitis, ailments, anxiety/sleep disturbances, capillary frailty, constipation. In some cases, the consumption was due to other problems, mainly respiratory or dermatological.

Sixty out of 109 women (55%) took regularly herbs potentially harmful for pregnancy (mostly chamomile, licorice, fennel).

In the 88.2% of cases herbs were taken by oral route (infusions, drops, capsules), in the 11.8% of cases herbs were applied topically (creams, oils), in one case the product (propolis) was taken by inhalation.

Side-effects were reported by four women (3.7%), only in two cases communicated to the gynaecologist: constipation after a regular consumption of a tisane containing a mix of herbs (fennel, nettle, hibiscus, wild rose, brown alga); rash and itching after local application of aloe or almond oil (in one case used in the 3rd trimester, in the other two cases applied throughout pregnancy).

The majority of our study population purchased herbal products in a pharmacy (40/109, 36.7%), in a herbalist shop or in a megastore (34/109, 31.2%). Fifty-two women (47.7%) did not obtain information about

Table 2. The most frequently herbs used by our pregnant women

Herb	n (%)	Route	Reported reasons for use
Chamomile	48 (44)	Oral, topical	Anxiety, digestive problems, stretch marks
Licorice	15 (13.8)	Oral	Hypotension, digestive problems, strengthen immune system
Fennel	13 (11.9)	Oral	Digestive problems, swelling, galactogenesis
Aloe	11 (10.1)	Oral, topical	Digestive problems, constipation, capillary frailty
Valerian	11 (10.1)	Oral	Anxiety
Echinacea	10 (9.2)	Oral	Common cold, anxiety, strengthen immune system
Almond oil	10 (9.2)	Topical	Stretch marks
Propolis	7 (6.4)	Oral, inhalatory	Sore throat
Cranberry	5 (4.6)	Oral	Urinary tract infections, reduced microcirculation, galactogenesis

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this kind of therapy from a healthcare provider (physician or pharmacist) and did not look for advice from their doctors (81/109, 74.3%). The decision to use herbal products was mainly based on personal judgement (44/109, 40.4%) or on information coming from parents/friends/media (18/109, 16.5%). The choice to use an herbal product during pregnancy was based on previous habitual use (33/109, 30.3%) and the conviction that these natural substances would be safer than traditional medicines (47/109, 43.1%). The most of women considered these therapies beneficial, reporting good results in the 74.3% of cases.

Pregnancy and neonatal outcome

As shown in Table 3, we did not find any difference between users and non-users as regards primiparity, smoking and alcohol habits, the presence of a chronic disease and medication use during pregnancy. Instead, we found a statistically significant difference in morbidities (52.3% vs. 37.8%, $\chi^2 = 6.202$, $p = 0.013$): users reported more frequently to suffer problems related to pregnancy such as hyperemesis, threatening miscarriage (mostly at 4th–5th month of gestation), gestosis, hypertension, hyperglycemia, urinary tract infections, constipation and hemorroids. In particular, the incidence of threatening miscarriages resulted higher in users, even if not statistically significant (14.7% vs. 8.1%).

Table 3. Information about pregnancy and delivery

Variable	Users ($n = 109$)	Non-users ($n = 283$)	p-Value
Parity*			
1	54 (49.5%)	157 (55.5%)	
>1	55 (50.5%)	126 (44.5%)	NS
Smoking habit			
Yes	7 (6.4%)	14 (5%)	
No	102 (93.6%)	269 (95%)	NS
Alcohol habit			
Yes	23 (21.1%)	47 (16.6%)	
No	86 (78.9%)	236 (83.4%)	NS
Chronic disease			
Yes	14 (12.8%)	31 (10.9%)	
No	95 (87.2%)	252 (89.1%)	NS
Morbidities			
Yes	57 (52.3%)	107 (37.8%)	$\chi^2 = 6.202$
No	52 (47.7%)	176 (62.2%)	$p = 0.013$
Medication use			
Yes	57 (52.3%)	132 (46.6%)	
No	52 (47.7%)	151 (53.4%)	NS
Threatening miscarriage			
Yes	16 (14.7%)	23 (8.1%)	
No	93 (85.3%)	260 (91.9%)	NS
Pregnancy at term			
Yes	92 (84.4%)	249 (88%)	
No	17 (15.6%)	34 (12%)	NS

*1 = first child.

As regards newborns, some neonates had problems at birth (respiratory distress syndrome, patent ductus arteriosus, presence of meconium stained amniotic fluid, infection), but none of the studied outcome variables were influenced significantly by maternal herbal use with the exception that neonates of users were more frequently small for their gestational age (11.9% vs. 5.3%, $\chi^2 = 4.258$, $p = 0.039$).

An unspecified cardiac malformation (presumably related to Down syndrome) and an enlarged kidney were diagnosed in two neonates after a regular maternal consumption of chamomile.

By examining separately every herb, among the 37 regular users of chamomile and 14 regular users of licorice we observed the higher frequency of threatening miscarriages (21.6% and 35.7%, respectively) and preterm labours (21.6% and 16.7%, respectively) compared to non-users. A regular consumption of ginger throughout pregnancy resulted in uterine hypercontractility and placenta previa at 4th month, leading to a preterm birth at 36 weeks' gestation. Moreover, a possible correlation was seen between a prolonged echinacea intake and intrauterine growth restriction observed in a 35 week newborn (Table 4).

DISCUSSION

Our research underlines that the use of herbal products during pregnancy is common among Italian women, confirming a prevalence of use previously reported by other authors both in Italy[5,11] and in other European

Table 4. Neonatal characteristics

Variable	Users ($n = 109$)	Non-users ($n = 283$)	p-Value
Gestational age (weeks)	38.6 ± 2.3	38.7 ± 1.9	NS
<25	—	—	
25–28	2 (1.8%)	2 (0.7%)	
29–32	1 (0.9%)	1 (0.4%)	
33–36	14 (12.8%)	29 (10.2%)	NS
≥37	92 (84.4%)	251 (88.7%)	
Birth weight (g)	3179.7 ± 711.2	3253.5 ± 539.9	NS
<800	—	—	
800–1499	3 (2.8%)	3 (1.1%)	
1500–1999	3 (2.8%)	6 (2.1%)	
2000–2500	7 (6.4%)	17 (6%)	NS
>2500	96 (88.1%)	257 (90.8%)	
SGA	13 (11.9%)	15 (5.3%)	$\chi^2 = 4.258$ $p = 0.039$
Low Apgar score	5 (4.6%)	7 (2.5%)	NS
Malformations	2 (1.8%)	—	
Problems at birth	8 (7.3%)	18 (6.4%)	NS
Drugs at birth	11 (10.1%)	16 (5.7%)	NS

SGA, small for gestational age (below the 10th centile).

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countries[3,4]: 27.8% of the interviewees used at least one herbal product and in about 40% of cases this use covered the entire period of pregnancy with a peak in the 3rd trimester. The proportion of women who used herbs increased throughout pregnancy and this may be explained by the concern of conventional drug use in the organogenetic period and/or the increase of pregnancy-related problems. Moreover, rather than a difference between nulliparae and women with previous deliveries, an habitual use influenced the choice of this kind of therapy confirming previous data.[1,5,12,13]

As regards socio-demographic characteristics, our sample of 392 women has to be considered representative of regional population. Users were similar to non-users on the majority of variables included in the study and a statistically significant difference was found only in relation to age and place of residence: the use of herbs was higher among pregnant women living in rural areas and aged 31–40 years, as also reported by other authors.[4,13,14]

Some considerations about efficacy and safety have to be pointed out.

The herbs most commonly used in this study corresponded to what has been found in previous studies.[3,5,13,15] However, in some cases herbal use was unjustified or not supported by scientific clinical evidence, for example cranberry to improve peripheral circulation[16] and echinacea to potentiate immune response.[17] This inappropriate use may be explained by information often derived by other sources rather than by healthcare providers. Moreover, despite the main reason for herbal use in pregnancy seems to be the safety aspect, 55% of the women used regularly products potentially harmful or with inadequate documentation to evaluate safety in pregnancy,[16] percentage reported also by other authors.[14,18] Among the herbs regularly taken during pregnancy by our women, an excessive use of chamomile has to be considered potentially harmful in pregnancy due to its contraction-inducing properties,[19,20] while licorice and fennel should be contraindicated due to little or absent data on their safety profile.[21] As regards the other herbs more frequently used, cranberry and echinacea safety in pregnancy remains unproven[16,22] and aloe should be avoided due to its uterine-stimulating properties.[16] In addition, some women took ginger for its antiemetic effects and senna for constipation, even if spontaneous abortions have been reported after ginger intake[23] and senna contains anthraquinones that could cause contraction of smooth muscles of the uterus.[7]

Obviously, the safety of an herb depends also by the modalities of administration and the frequency of use. The topical use reported by approximately 12% of interviewees could minimize the exposure to the foetus, but the lipidic characteristics of the product could favour systemic absorption. In particular, almond oil frequently used for stretch marks contains a high percentage of oleic and linoleic acids. In some formulations, traces of arachidonic acid have been found, leading to prostaglandins known to induce uterine contractions.[24] Stamatas *et al.* [25] measured lipid human skin uptake of different vegetable oils, including almond oil, and found a modest swelling (about 20%) of the stratum corneum. This suggests a cautious use of this oil and the need to inform pregnant women about its skin penetration. Moreover, even if about 60% of women used herbs occasionally, the remaining 40% used these products throughout all pregnancy increasing the risks for the foetus.

In every case, use of herbs during pregnancy must always consider that two parties are involved, the mother and the foetus.

Independently from pregnancy, maternal risks are associated with the properties of the herb taken. Even if not medically documented, the four adverse effects reported by our interviewees are all supported by literature. Constipation related to the regular consumption of a tisane containing a mix of herbs is probably due to a rebound effect, considering the presence of substances with diarrhoeal properties.[16] With both almond oil and aloe, a percutaneous sensitization[26] and generation of ROS by anthraquinones under UVA[27,28] have been suggested.

Moreover, certain properties of plants may affect pregnant women with concurrent conditions.[19,20] By examining carefully data on pregnancy, we did not find any relationship between the consumption of certain herbs and the exacerbation of a specific chronic disease. Rather, we found an higher statistically significant incidence of women with morbidities pregnancy-related among users. By a detailed analysis, a distinction have to be made between minor disturbances such as nausea or constipation (that could have caused the use of herbs) and more serious problems such as threatening miscarriage hypothetically caused by herbal use.

Otherwise, as previously underlined by other authors,[1,4,21] herbal use could influence pregnancy outcome: risk of abortion or preterm labour, presence of malformations, intrauterine growth and neonatal birth weight.[7,16,19,29,30] Clear evidence of adverse effects on pregnancy outcome by herbs used during pregnancy exists only in some cases, for other plants advisory warnings are cautious since available data on their safety are limited and a cause–effect relationship has not been established.[9] More complex is the issue of potential damages to the foetus, since teratogenic

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effects of most of herbs are not fully ascertained. None of the published studies identified an increased risk for the unborn child, but these studies were small and could not rule out negative effects on pregnancy outcome.[19,31–33]

In our study population, no statistical significant differences were evident between users and non-users as regards pregnancy outcome, with the exception of an higher incidence of newborns small for gestational age. Moreover, by a more deeply analysis of the data a possible influence of a regular intake of two herbs (chamomile and licorice taken from the beginning of pregnancy) on threatening miscarriages and preterm labours of low birth weight infants could be hypothesized. Other authors underlined this aspect, reporting about a 3% of cases of premature delivery related to a regular consumption of chamomile during pregnancy[34] and a two- to threefold increase in the risk of preterm birth after an heavy maternal intake of licorice[29] plausible because of the effects of glycyrrhizin on cortisol and prostaglandins metabolism.[35] In addition, even if preterm birth is a multifactorial state whose aetiology is still poorly understood,[35] two cases were difficult to explain on the light of ''physiological'' pregnancies where diseases, drug treatments or other risk factors were absent. In the first case, a regular consumption of ginger (twice daily throughout pregnancy) could be related to maternal problems observed at 4th month (hypercontractility, placenta previa) and to the preterm birth because of possible inihibition of testosterone binding in the foetus and mutagenic properties of 6-gingerol at high doses.[36] In the second case, a possible relationship between a prolonged echinacea intake and intrauterine growth restriction in a 35-week newborn was seen (data submitted) on the basis of an antiangiogenic activity by the herb.[37]

As regards the two cases of malformations observed in our study population, it is difficult to ascribe the enlarged kidney but overall the cardiac defect observed in a neonate with Down syndrome to a regular chamomile consumption.

Finally, concerning attitudes toward herbal products in pregnancy, most of interviewees revealed a naive approach considering herbs generally riskless and safer than conventional drugs. This behaviour influences also the patient–physician relationship and well correlates with a choice made on a self-basis or an habitual use not always communicated to healthcare providers. This kind of approach not devoid of risks has been observed also by other authors[12,13] and may be the result of the general conviction that these products being natural are safe[8] and then particularly appealing to pregnant women always concerned about foetal well-being. On the contrary, rigorous scientific studies on safety of herbal products are often unavailable and this lack of knowledge may represent a serious problem overall during pregnancy, since women may get, through websites and magazines, different and unreliable information.

Naturally, this study has some weaknesses, such as the sample size which limited the statistical analysis of the data leading to an examination of herbal use as a homogeneous exposure, while it is possible that individual herbal components could have differently affected pregnancy outcome. Moreover, our sample is representative of a regional rather than a national reality. Otherwise, the major strength of our work is that this is the first attempt to correlate herbal use with pregnancy outcome on the basis of data obtained from questionnaires filled with face-to-face interviews within 3 days after childbirth (this makes easier for women to remember their gestational period) rather than from mailed questionnaires or national registries.

In conclusion, the use of herbal products during pregnancy is common and popular despite being poorly studied. This frequent use is particularly worrisome because many of these compounds are taken without an expert physician's advice and often not supported by adequate information.[5] Healthcare providers should not ignore the use of herbs during pregnancy and should be aware of the actual properties of herbs to better develop counselling strategies mainly for habitual users. Appropriate knowledge would enable the physician to advise the pregnant patient on which herbs she should avoid and on those she may use according to her preference.

KEY POINTS

- Among our study population of Italian pregnant women, 27.8% used at least one herbal product during pregnancy mainly on the basis of a previous habitual use and on the conviction that natural substances would be safer than conventional drugs.
- In some cases, herbal use was unjustified or not supported by scientific clinical evidence and 55% of the women used potentially harmful products.
- Increased documentation about the safety of herbal products in pregnancy is needed.
- Healthcare professionals should be encouraged to ask pregnant women about the use of herbal products during the whole pregnancy.

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CONFLICT OF INTEREST

The authors have no conflicts of interest directly relevant to the content of this paper.

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APPENDIX: ITEMS INCLUDED IN THE PRESTRUCTURED QUESTIONNAIRE (FIRST SESSION)

1. Have you taken any herbal medication during current pregnancy?
2. If yes, in which period?
3. If no, do you consider this kind of therapy as useful?
4. If no, do you consider this kind of therapy as safe?
5. Have you used any herbal product before you became pregnant?
6. Which plant/herb have you taken (see list)?
7. For which health problem or symptom?
8. With which dose, formulation, route of administration and frequency?
9. Where did you purchase the herbal product?
10. Who introduced you to the herbal therapy?
11. In case of choice without a medical prescription/advice, did you communicate it to your physician afterwards?
12. If no, why not?
13. Why did you choose an herbal product rather than a traditional drug?
14. Did you inform the pharmacist (herbalist) of your pregnancy?
15. Did you receive information about quality, risks and instructions about the consumption of an herbal product?
16. If yes, who provided them?
17. Did you perceive benefits from taking this kind of therapy?
18. Did you observe side-effects?
19. If yes, which?
20. If yes, did you communicate to your physician?

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