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The Use of Non-pharmacological Herbs in Treating Cough and Respiratory Symptoms in Saudi Arabia: a Multi-center Study

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ABSTRACT

Background: Herbal medicinal products, a subgroup of complementary and alternative therapy (CAM), are widely used for pediatric respiratory symptoms in Saudi Arabia. However, regional variations and safety concerns remain understudied. **Objective:** This study examines the prevalence and patterns of herbal remedy use for cough and respiratory illness among Saudi children. **Methods:** A multi-center cross-sectional questionnaire-based study was conducted across five Saudi regions (N=475). Data were collected via a validated questionnaire (Cronbach's $\alpha = 0.85$) and analyzed using SPSS v25. **Results:** The mean age was 3.97 ± 3.60 years. Herbal remedy use was highest in the Western province (37.8%, $p < 0.001$). Sesame oil (19.8%) and olive oil (18.2%) were most common. Family/friends provided 82.8% of advice. Self-rated improvement was "excellent/good" in 59.9%, with 96.6% reporting no adverse effects. Fathers with postgraduate degrees used fewer herbal remedies ($p=0.003$). **Conclusion:** Herbal remedy use is prevalent, emphasizing the need for healthcare providers to document usage and educate families. Further research is required to evaluate efficacy and safety.

Key words: Cough, Herb, Complementary Medicine, respiratory, traditional medicine.

1. BACKGROUND

Herbal medicinal products are a subgroup of complementary and alternative therapy (CAM) which describes medicinal substances that include herbal active ingredients. Herbal products are used in several communities with a variety of applications to treat illnesses (1). According to the World Health Organization (WHO), 75% of the people around the globe use herbal products for basic healthcare needs (2). Locally, multiple studies in Saudi Arabia have found widespread adoption of CAM use among the public and medical physicians (3-5). Spiritual practice, honey, bee products, medical herbs, Hijama, nutritional supplements, cauterization, and camel milk and urine are some of the most commonly adapted approaches (5).

The majority of published studies of CAM use among Saudis were found to originate in the central region of Saudi Arabia, with only few studies published in other areas. Furthermore, spiritual practice was found to be the most reported method of CAM use in these regions, followed by herbal and honey use (6). In children and adolescents, the use of herbal products is generally known to be prevalent especially in children with chronic illnesses (7). According to some studies, the most common symptom of CAM usage among adolescents was abdominal pain, followed by flu symptoms (8). Several medical treatments for cough have been tested, however the majority have been found to be ineffective in children (6-8). As a result, many concerned parents turn to CAM to help their children cope with their

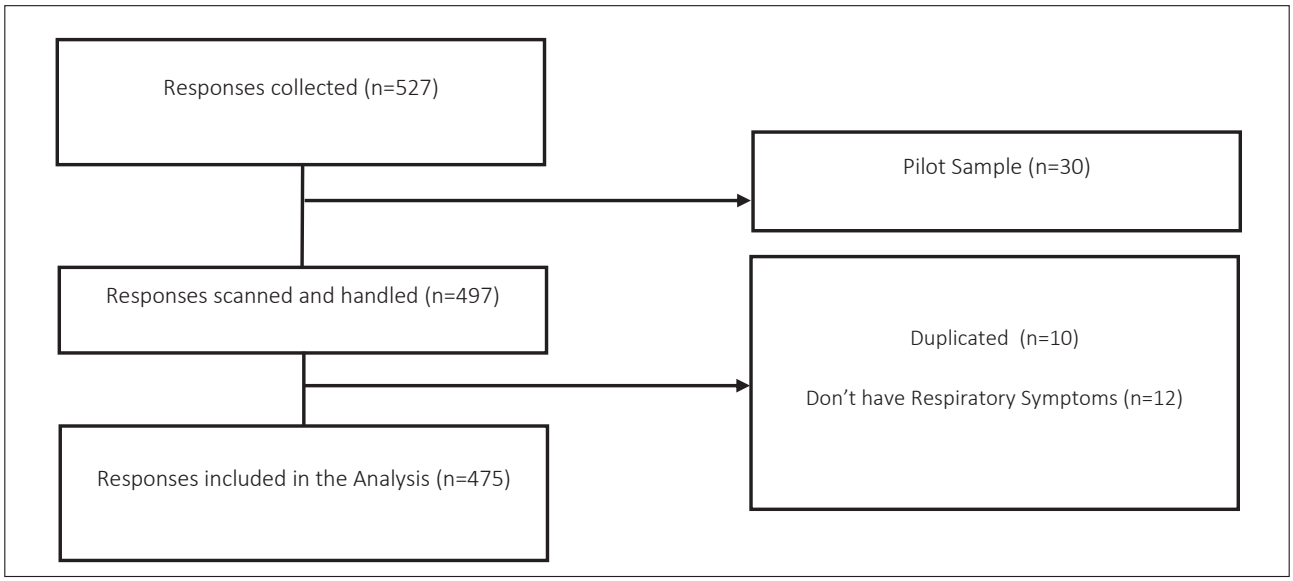

Figure 1. Flowchart of participant inclusion and exclusion

symptoms. However, in the lack of solid data, this practice could have relatively unfavorable outcomes (9). Additionally, there is a widespread perception in some societies that oily treatments might help with cough and other cold symptoms. For instance, forced feeding of ghee and nasal inhalation of olive oil or ghee have been implicated in several cases of infants and children developing exogenous lipoid pneumonia (10).

In the literature, one multicenter study was conducted in Saudi Arabia aiming at determining the prevalence of herbal products usage among children with acute respiratory tract infection. Sesame oil, fenugreek, olive oil, and dates soaked in water were found to be the most often used cough remedies, with various methods of administration (11). However, to the best of our knowledge, the herbs usage evidently varies based on the region and population. Nonetheless, there are a limited number of articles targeting pediatrics herbal use for cough and respiratory illness management.

2. OBJECTIVE

This study aims to examine the prevalence and pattern of non-pharmacological agents' usage for cough and respiratory illness among Saudi children in different regions of the kingdom.

3. MATERIAL AND METHODS

This is a multi-center cross-sectional questionnaire-based study which took place in several hospitals located across all five main provinces of the kingdom of Saudi Arabia: Central, Eastern, Western, Southern, and Northern. The target population was patients presenting to the outpatient, inpatient or emergency department with a respiratory complaint. Those included were older than three months and less than 14 years, of any sex or nationality. Patients who were admitted to the pediatric intensive care unit and patients with non-respiratory symptoms were excluded from the study.

Participants were recruited using a consecutive sampling technique. Through estimation of the population of Saudi Arabia at 35,306,000 with 5% margin of error and a 95% confidence interval, the minimal acceptable number of sample size was calculated via the checkMarket sample size calculator to be 385 Patients. Taken into consideration the possible refusals and incomplete responses, a total sample size of 500 was decided, expecting 100 responses from each province. The questionnaire was constructed based on several previously described surveys aiming to assess herbal use. It was presented and evaluated by four experts in the field, the questionnaire's reliability was confirmed via a pilot study (n=30), yielding a Cronbach's alpha of 0.85.

Three main sections of the questionnaire were of relevance to this study. The first section is regarding the participants' socio-demographics, which includes the child's age and sex, the parents' age and level of education, and occupation, and their household income, residential area and location. The following sections were completed by only those who have used herbal or oil products for their respiratory symptoms. Common herbs reported in the literature were listed, among which the participants chose what they have used. Other non-listed herbs and oils mentioned by Participants were recorded. The third section aimed to explore the characteristics of herbal use; including the frequency, route of administration, source of advice, perceived improvement, and any side effects.

Data collection was carried out between the months of July and November 2021. Participants were approached, and informed consent was obtained and documented from all those who have agreed to participate. The questionnaire was sent via a messaging platform to the participants, and it was self-administered, with the data collectors being available at the time to answer any ambiguity that might arise. A total of 497 responses were recorded. Other responses that had to be excluded after examining the data were ten

duplicate responses, and 12 who did not have any respiratory symptoms. (Figure 1). The data was thoroughly scanned and checked for any inconsistency and missing points. Responses of open-ended questions were consolidated and categorized. Incomplete and responses were marked, and data collectors re-contacted the participants to gather the missing points to complement the analysis.

Data analysis was done using the software package of Statistical Package for the Social Sciences (SPSS) version 25.0. Continuous variables were calculated by the mean ±SD, maximum, minimum, and range and will be evaluated using independent samples t-test. Categorical data were measured by frequencies and percentages. Possible associations between the factors influencing using herbal agents and patients' demographics were evaluated by a chi-square test. The confidence interval was set at 95% and statistical significance was determined at P value ≤ 0.05. The ethical approval was obtained from the Institutional Review Board and Research Center of Imam Abdulrahman Bin Faisal University. (IRB-2021-01-219, Approval Date: 28/06/2021). In order to protect the participant privacy, the participants' data were kept strictly confidential and only used for research purposes. Participants could withdraw from the study at any time before the response was submitted.

4. RESULTS

Mean age of study participants was 3.97 ± 3.60 years with ages ranging from three months to 14 years. Subgroup analysis based on age and gender can be found in Table 1. 93.3% were Saudi nationals. Parental demographic data can be seen in Table 1.

Demographic (N=475)	n (%)	Mean ± SD
Age groups	475 (100%)	3.97 ± 3.60
Infants (0 to <1)	19 (4%)	
Toddlers (≥1 to <3)	31 (6.5%)	
Young School-aged (≥3 to <10)	109 (22.9%)	
Older school-aged (≥10 to <13)	151 (31.8%)	
Adolescents (≥13)	165 (34.7%)	
Gender groups	475 (100%)	
Female	201 (42.3%)	
Male	274 (57.7%)	
Maternal age	472	33.34 ±6.70
Paternal age	471	38.63 ±8.13
Maternal education	475	
Primary/middle	52 (10.9%)	
Secondary	118 (24.8%)	
Bachelor	274 (57.7%)	
Diploma	12 (2.5%)	
Post graduate	7 (1.5%)	
Illiterate	12 (2.5%)	
Paternal education	473	
Primary/middle	50 (10.6%)	
Secondary	116 (24.5%)	
Bachelor	269 (56.9%)	
Diploma	18 (3.8%)	
Post graduate	19 (4.0%)	
Illiterate	1 (0.2%)	
Monthly Household Income	475	
<2000 Saudi Riyal (SR)	13 (2.7%)	
2000-10000 SR	239 (50.3%)	
>10000 SR	223 (46.9%)	
Paternal Employment Status	475	
Employed	404 (85.1%)	
Unemployed	71 (14.9%)	
Maternal Employment Status	475	
Employed	143 (30.1%)	
Unemployed	332 (63.9%)	

Table 1: Demographics of the participants:

The included participants had an almost similar provincial distribution (n=109, 22.9% from the Eastern area; n=103, 21.7% from the Western; n=75, 25.8% Central; n=89, 18.7% Northern and; n=99, 20.8% Southern). Most regions scored high prevalence of use, 95% of the participants from the western region were using herbal remedies, compared to 70.8% and 49.3% among northern and central region participants; respectively. The Southern and eastern provinces recorded the lowest prevalence among the five regions (33.3%, 25.7%, respectively). Those from the Western province had the most use of herbal remedies for cough among other provinces, and it was statistically significant (37.8%, p <0.001). Most of the participants found to be living in urban areas (93.5%). The difference of use of cough remedies between urban and rural settings was not statistically significant (p = 0.126)

Of the 475 study participants, a little more than half (54.5%) were recorded to be using herbal product for cough and other respiratory symptoms. Among those participants, 96 (20.2%) participants reported using at least two non-pharmacological products, and 45 (9.5%) admitted using three remedies. Sesame oil and olive oil were the most commonly remedies reported to be used (n=74, 19.8%; n=68, 18.2%; respectively), followed by honey (n=37, 9.9%), boswellia and chamomile (n=18, 4.8%; n=16, 4.3%; respectively) (Table 2).

Of the 232 that answered the survey regarding source of herbal remedy advice, 82.8% of the participants followed family and friends' recommendations as a source of herbal use. Health practitioners were less than 5% of those providing advice. Oral (n=221, 80.4%) and Rubbed remedies (n=144, 52.3%) were among the most common methods parents used to administer the non-pharmacological treatments, while only 3.6% of the participants reported using any of the products as inhaled remedies (n=10). Parents used the remedies for similar previous episodes 74.6% of the time with use of the same herb multiple times 43.5% of participants. Self-rated improvement replies varied from excellent and good (59.9%) to poor and fair (40.1%) with 96.6% claiming no adverse side effects of the remedies. 63%

Herbs used	n	%
Sesame oil	74	19.8
Olive oil	68	18.2
Anise	45	12.1
Honey	37	9.9
Boswellia	18	4.8
Chamomile	16	4.3
Guava leaves	13	3.5
Vicks Vaporubs	12	3.2
Anzroot	11	2.9
Garden cress	10	2.7
Myrrh	10	2.7
Thyme	10	2.7
Black seed	9	2.4
Cumin	8	2.1
Fenugreek	8	2.1
Mint	6	1.6
Ginger	4	1.1
Garlic	2	0.54
Maramyah	2	0.54
Dates	2	0.54
Pumpkin	1	0.27
Camphor oil	1	0.27
Green tea leaves	1	0.27
Saussurea costus	1	0.27
Rock Candy	1	0.27
fennel	1	0.27
Lemon	1	0.27
Dill seed water	1	0.27

Table 2. Herbal products used

of those that responded they had excellent outcome to the remedies also used them on multiple occasions, while 46.2% of those that responded with poor outcome or improvement only used them once ($p < 0.001$). Paternal education level was significant at $p = 0.003$ for the use of herbal remedies as only 2.3% of those with post graduate degrees used herbal remedies in contrast to 64.5% of those with only bachelor degrees. Maternal educational level was not significant for the use of herbal remedies ($p = 0.055$) nor was household income ($p = 0.524$).

5. DISCUSSION

The use of herbal products for cough in pediatric patients has been reviewed by numerous researchers globally. However, herbs are used differently by different populations and geographical areas. Our findings showed that the use of herbal products is common throughout the kingdom. The prevalence ranged between 95% to 25.7% across the regions, with the western province having the highest prevalence when compared to the other regions. Sesame oil followed by honey, boswellia and chamomile were the most frequently used as herbal product to alleviate cough and respiratory symptoms. Another study conducted in two centers in Saudi Arabia revealed similar findings with sesame oil being the most herbal product used followed by fenugreek and olive oil (11) .To the best of our knowledge, no additional papers have been published to investigate the most frequently utilized herbs in a multicenter sitting.

In our study, there was no significant difference in usage of herbal products between urban and rural settings which was not in line with another study conducted in Ethiopia that reported significant usage in rural areas among children (12). The same study reported that low income is a significant factor that affected parents use of traditional medicine for their children, compared to the insignificant association found in our study.

Our results showed that fathers with postgraduate degrees have significantly lower rates of herbal remedies usage compared to bachelor's degrees fathers. Fathers with postgraduate degrees were significantly less likely to use herbal remedies compared to those with bachelor's degrees ($p = 0.003$). This aligns with studies suggesting higher education reduces reliance on CAM, possibly due to increased awareness of evidence-based medicine (3, 13). Another study conducted in Bisha in the southern region of Saudi Arabia showed that illiterates used herbal products more frequently than others to elevate symptoms of chronic diseases. (13) Moreover, A multicenter study conducted in Saudi Arabia found that the usage of herbal products is three times higher among adults who have only high school degrees compared to those who have higher educational degrees (3). However, there is no comparable study in Saudi Arabia that focuses on younger children.

On the other hand, numerous studies have produced a wide variety of contradictory findings; some have found that postgraduates use conventional medicine at high rates, while others have found the exact opposite (14,15). The variance between the different countries' backgrounds could be explained by a variety of cultural and geographical factors which heighten the demand for additional research focusing on the usage of herbal medicine among Saudi Arabia's population.

In the current study, our findings showed that rubbed and oral remedies were the main route of administration, while nasal route was the least used. Comparatively, a multi-center Saudi study established that herbal products were administered through oral followed by nasal route, with olive oil and myrrh being directly administered nasally (11). Another study conducted in Northwest Ethiopia included children with different health conditions. Pulmonary symptoms constituted only 10.7% of the participants treated by traditional medicine and it was mainly administered through oral route (44%) followed by dermal route (24%) (12).

Moreover, when investigating common sources of practicing CAM among participants, the results were pointing toward a higher tendency of seeking recommendations from relatives and friends. The results of the present study were consistent with several prior studies in which physicians were not the main source of information. A cross sectional study was published in 2015 in order to study CAM use among the Saudi adolescents in the eastern region, the results

demonstrated that the most CAM users obtained their knowledge from family and friends compared to following traditional media and internet instructions (16). Moreover, a study conducted by AL-Jabi et al. in palestine included children aged six years or younger reported 69% of the participants have followed relatives/friends advice followed by the child's physician and media (41.7% and 40.7%, respectively) (17).

Our Data showed that 59.9% of the study participants perceived excellent to good response to herbal medicine used to alleviate cough and other respiratory symptoms, with only 3.4% of them experiencing side effects including gastrointestinal upset, fever, and shortness of breath. Moreover, those with excellent to good response were more likely to have had used herbal medicines with higher frequency compared to those with poor response. Our results are consistent with data published in the literature. A Saudi cross sectional survey conducted in 2014 showed that 61% had a positive experience with the use of traditional medicine, with only 1.7% experiencing side effects (11). Similarly, Tuncel et al. reported that 70% of the participants benefited partially or fully from the use of complementary and alternative medicine, while only 11% perceived some side effects (18). A German Study which took place between the year 2004 to 2006 compared herbal medicinal products to conventional medicine. It was found that herbal medicinal products were less likely to be reported by the participants as greatly effective compared to conventional medicine. However, herbal medicinal products had a lower proportion of reported side effects than conventional medicine (1).

This is the first study that included the five main sectors in Saudi Arabia. The responses were self-administered via a messaging platform to the participants. However, this study has several limitations. First, the reliance on self-reported data introduces potential recall bias, as parents may inaccurately remember details of herbal use. Second, the cross-sectional design limits our ability to establish causality between herbal use and perceived outcomes. Third, uneven regional representation (e.g., 93.5% urban participants), which may affect generalizability to rural populations. Finally, the lack of objective clinical measures (e.g., symptom severity scales) restricts the interpretation of self-rated improvement. Future studies should incorporate longitudinal designs and clinical assessments to validate these findings.

6. CONCLUSION

Our results showed a relatively high tendency to the use of herbal products for cough and other respiratory symptoms in Saudi Arabia, particularly among those living the western region. Sesame oil was the leading herbal product used, with around 10% of the participants using three or more herbal products, and around 60% reporting excellent to good response to these products. These data indicate the importance of proper history taking by healthcare practitioners who need to be vigilant to potential adverse outcomes of these herbal products. Hence, future research to evaluate the effects of these herbs objectively is required to be able to provide accurate evidence-based advice regarding the use of these products.

Abbreviations

CAM= complementary and alternative therapy; SPSS= Statistical Package for the Social Sciences; WHO= World Health Organization.

- **Ethic Committee:** The ethical approval was obtained from the Institutional Review Board and Research Center of Imam Abdulrahman Bin Faisal University (IRB-2021-01-219, Approval Date: 28/06/2021).
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