REVIEW ARTICLE

Ayurvedic approach to maternal health: A review of literature

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Abstract

Maternal health refers to the health aspects of pregnancy, childbirth, and post-partum care. Ayurveda may offer some solutions to maternal health problems. Hence, a review of the literature was carried out to understand the role of Ayurveda in maternal health using internet based search engines; PubMed and Google Scholar. Of 70 articles identified six articles were finally selected for this review based on full text articles from both the sources. It was observed that original clinical research in this particular subject is comparatively few. The records found in these databases are primarily theoretical research or review articles. Of these six titles: one article ($n = 6$) is related to growth-related problems, four articles ($n = 6$) are related to maternal anemia, and one article ($n = 6$) is related to pregnancy-related nausea and vomiting. None of the original research is related to childbirth or post-partum care; hence, this review primarily focused on pregnancy-related problems and their ayurvedic approach. Poor research in this direction indicates that either research is very few in this area, or the research results are not being disseminated in the form of research publications. Ayurvedic principles and therapeutic regimens may offer some solution for various types of pregnancy-related problems hence research in this clinical area is highly desirable. Given the situation of maternal morbidity and mortality, research regarding the role of Ayurveda in pregnancy and other areas of maternal health should be fostered across the health system.

Key words: Ayurveda, fetal growth retardation, *Garvini pandu*, maternal anemia, maternal health

INTRODUCTION

Maternal health constitutes the health of women during the pregnancy, childbirth, and post-partum period.[1] Among these three important components, pregnancy forms the foundation of maternity cycle and strongly influences the outcome of two other components; childbirth and post-partum care. Moreover, maternity cycle includes five important phases; (a) Fertilization, (b) antenatal or prenatal period, (c) intra-natal period, (d) post-natal period, and (e) inter-conceptional period.[2] In general, motherhood is very often a positive and fulfilling experience in developed countries. However, in many developing countries, motherhood is associated with suffering, ill-health, and even death. The predominant direct causes of maternal morbidity and mortality include hemorrhage, infection, high blood pressure, unsafe abortion, and obstructed labor.[1] Figure 1 shows the percentage distribution of different causes of maternal death in India.[3,4] In the Indian context, the milieu of maternal health has always been a great public health concern. There is a great degree of variation in maternal health situation in India among different states, rural-urban distribution pattern, rich and poor socio-economic status and level of education, and availability of health services. Maternal mortality ratio (MMR) is used as the best indicator to measure the maternal health situation in any nation.[5] As per the Sample Registration System of India, the current MMR is 167/100,000 live births during 2011-2013, with the majority of deaths occurring in the age group of 20-24 years.[6] Figure 2 shows the trend of MMR in India. The variation in MMR in different Indian states shows a wide gap, which ranges from 285 in Uttar Pradesh, being the highest, to 61 in Kerala, being the lowest.[6] The current rate of reduction of MMR in India is 5.5% and has achieved around 62% reductions toward the target of 109 by 2015.[7] Ayurveda, one of the ancient medical doctrines of

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Received: 12-12-2015
Revised: 27-01-2016
Accepted: 28-01-2016

human civilization, may offer some solutions to the maternal health problems in India and contribute to alleviate the public health burden owing to maternal health. These practices based on strong theoretical foundations of Ayurveda can offer safe, cost-effective, and relevant management to the most important phases such as puberty, pregnancy, birth, and post-natal care. Moreover, mainstreaming the ayurvedic practices in maternal health care appears to be the most effective remedial measure to lower MMR and promote maternal health in India.[8] Hence, a review was carried out based on the original researches on the role of Ayurveda in maternal health.

STRATEGIES FOR THIS REVIEW OF LITERATURE

The review of the literature was carried out in two phases adopting two search engines, PubMed and Google Scholar. Key words were used as per the definition of maternal health by World Health Organization; these include "pregnancy," "childbirth," "post-partum care," "maternal health," and "Ayurveda." The literature review was carried out from September 2015 to November 2015. In the first phase, PubMed search engine was used for literature search using the above-mentioned key words one after another using each word with Ayurveda. In the second phase, the similar search was adopted using Google Scholar search engine. After initial screening, 6 titles were finally selected for the review based on full text articles from both the sources. Figure 3 shows the search strategy adopted for the process of the literature search.

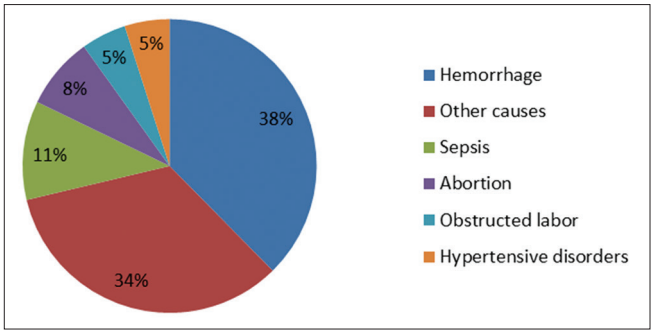

Figure 1: Causes of maternal death in India[3,4]

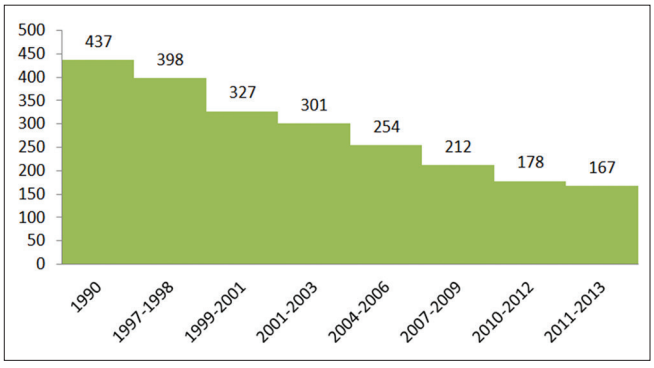

Figure 2: Trend of maternal death in India.[6] Source: Sample Registration System, Government of India

STUDIES ON VARIOUS ASPECTS OF MATERNAL HEALTH

Out of 70 (66 from PubMed and 4 from Google Scholar) articles identified 15 titles are found relevant to the subject of maternal health and Ayurveda. Out of total 15 titles; 8 articles are relevant to the role of Ayurveda in pregnancy, 1 title for childbirth, 2 titles for post-partum care, and 4 titles for maternal health in general. After rejecting reviews, case reports, editorials, commentaries 6 titles were finally selected for the review. All the articles are associated with pregnancy-related problems only.

Role of Ayurveda in Maternal Anemia

Four studies (n = 6) reported about the role of Ayurveda in maternal anemia. These studies primarily reported about different ayurvedic formulations and their efficacy on maternal anemia and more specifically iron deficiency anemia. The study conducted at Dharmartha Ashtang Ayurveda Hospital, Pune, among 35 subjects with anemia during pregnancy reported about the clinical efficacy of *Dadimadi Ghrita*.[10] *Dadimadi Ghrita* is composed of six ingredients; Dadima (*Punica granatum* Linn.), Dhanyaka (*Coriandrum sativum* Linn.), Chitraka (*Plumbago zeylanica*), Shunthi (*Zingiber officinalis* Roscoe), Pippali (*Piper longum* Linn.), and Ghrita (Cow ghee).[15] This drug was administered in empty stomach with a dosage of 10 ml every morning before 8 am with lukewarm water. Relief of anemia was observed among 16 subjects up to 51-75% followed by 8 subjects up to 76-100% and 11 subjects up to 26-50%.[10] Similarly, the second study conducted at the outpatient department of *Stree roga* and *Prasuti tantra* (Obstetrics and Gynecology), Gujarat

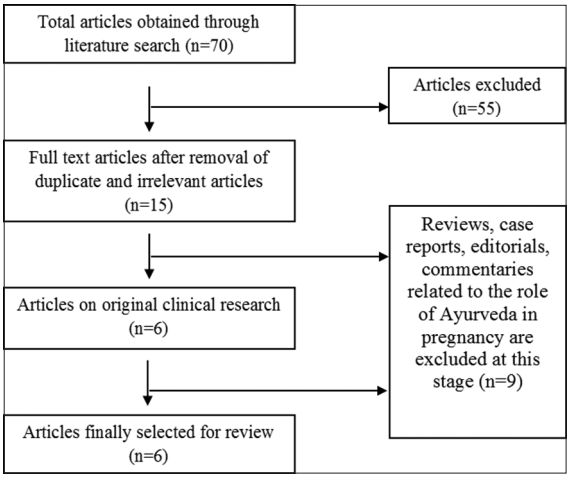

Figure 3: Flowchart showing the selection of articles for this review

Ayurveda University, among 22 pregnant women revealed the comparative efficacy of two hematinics (anti-anemic drugs) preparations; *Dhatrilauhavati* and *Pandughnivati*.[12] *Pandughnivati* is composed of Bibhitaki (*Terminalia belerica* Roxb.), Amalaki (*Emblica officinalis* Gaertn.), Punarnava (*Boerhaavia diffusa* Linn.), Vidanga (*Embelia ribes* Burm. f.), Shunthi (*Zingiber officinale* Rosc.), Maricha (*Piper nigrum* Linn.), Katuki (*Picrorhiza kurroa* Royle ex Benth.), and Pippali (*P. longum* Linn.) each in equal amount. Bhavana (Trituration) of Kumari Swarasa (extract of Aloe barbadensis miller) (one time), Gomutra (cow urine) (1 time), Punarnava (*B. diffusa* Linn.) (2 times), and Amalaki Swarasa (extract of *E. officinalis* Gaertn.) (2 times) were given during the preparation of the *Vati*. The second drug *Dhatrilauhavati* is composed of four parts Dhatri (*Phyllanthus emblica*), two parts Lauha Bhasma (an Ayurvedic medicine prepared from iron), and one part Yastimadhu (*Glycyrrhiza glabra*). Bhavana (trituration) with Amruta Kwatha (Decoction of *Tinospora cordifolia* Wall. ex Sringe.) for seven times was given during the preparation of the *Vati*.[12] In Group B, where *Dhatrilauhavati* was administered, the results obtained were highly significant. Statistically highly significant ($P < 0.001$) result was observed in all the subjective parameters such as *Panduta* (pallor) (50%) and *Shwasa* (dyspnea) (56.25%). Similarly, in other subjective parameters, significant (<0.05) results were obtained; *Shrama* (fatigue) (61.54%), *Hridrava* (palpitation) (55.55%), *Aruchi* (anorexia) (42.85%), and *Pindikodvestan* (leg cramps) (49.49%). Hemoglobin (Hb) concentration, total red blood cell, and packed cell volume were slightly increased, and total iron binding capacity was decreased in Group B, whereas no result was found in other objective parameters.[12] This observation was significantly better compared to another group where *Pandughnivati* was administered; hence, the study recommends *Dhatrilauhavati* as a right choice for iron deficiency anemia during pregnancy.[12] Furthermore, two more studies reported about the clinical efficacy of *Dhatrilauhavati*.[13,14] The salient observations of this drug in both these studies are described in Table 1. In addition to the above mentioned drugs, several of clinical studies are available on the role of *Punarnavadi Mandura* in managing maternal anemia which is an effective hematinic.[16-21] However, the same is not reviewed in this study as the studies are primarily on the trial of *Punarnavadi Mandura* and its effect on iron deficiency anemia which is beyond the scope of this review.

Role of Ayurveda in Pregnancy-related Nausea and Vomiting

The study conducted among 94 pregnant women at the Out Patient Department, *Prasuti tantra*, Sir Sunderlal Hospital, BHU, Varanasi revealed the clinical efficacy of *Garbhpal Ras* in pregnancy-induced nausea and vomiting.[11] *Garbhpal Ras* is composed of "Hingula" (Cinnabar - Hgs), "Vang" (Tin - Sn), "Nag" (lead - Pb), and "Lohbhasma" (Iron - Fe). Herbal contents of "*Garbhpal Ras*" include "Dalchini" (*Cinnamomum zeylanicum*), "Ela" (*Elettaria cardamomum*), "Tejpatra" (*Cinnamomum tamala*), "Marich" (*P. nigrum*), "Shunthi*'* (*Zingiber officinale*), "Dhanyak" (*C. sativum*), "Krishna jeerak" (*Carum bulbocastanum*), "Chavya" (*Piper retrofractum*), "Devdaru" (*Cedrus deodara*), and "Draksha" (*Vitis vinifera*). All the ingredients in same quantity except "Lohbhasma" (half quantity then others) were triturated in the extract of "Vishnukranta" (*Clitoria ternatea*).[22] 94 of these study participants were categorized into two groups, of which 55 women were administered with 120 mg of *Garbhpal Ras* twice daily along with folic acid while in the control group 39 pregnant women were administered with folic acid only. At the time of trial, nausea was found in 69.23% (n = 39) pregnant women in the control group while it was 67.23% (n = 55) in the trial group. At the time of second follow-up, significant changes were observed in *Garbhpal Ras* administered pregnant women in comparison to control group, and the symptoms disappeared completely after 3 months of pregnancy on its own. In the 3rd follow-up, nausea was still observed in 3.62% (n = 55) women in trial group compared to 15.38% (n = 39) in control group. Similarly, at the time of trial initially, 60% (n = 55) and 58.97% (n = 39) women of trial and control group, respectively, suffered from vomiting. The severity of symptom was more in the control group; 7.96% (n = 39) cases of severe degree of vomiting in the control group and 1.82% (n = 55) in the trial group. During follow-up, it was observed that relief in vomiting was more in the trial group; none of the women of *Garbhpal Ras* group had vomiting until the 3rd follow-up. Statistically significant difference was observed comparing 3rd follow-up with initial observation in the trial group.[11]

Role of Ayurveda in Fetal Growth

A clinical trial was conducted at the antenatal clinic unit of the Institute for Post Graduate Teaching and Research in Ayurveda, Jamnagar among 60 pregnant women of the 2nd and 3rd trimester. The 60 subjects were equally divided and were administered with powder of AtiBala in one group, and the other group received the powder of combination of Amalaki (*E. officinalis* Gaertn.), Godanthi (gypsum/calcium sulfate dihydrate), and *Grabhapala Rasa*. Group 1 received powder of Amalaki, Godanthi, and *Grabhapala Rasa* with a dosage of 1.5 g divided into 3 equal parts, thrice a day with lukewarm water for 12 weeks period and Group 2 AtiBala (*Abutilon indicum*) powder with a dosage of 9 g/day in three equally divided doses, with lukewarm water for 12 weeks.[9] The study concluded that the powder of AtiBala was better when compared with the powder of Amalaki, Godanthi, and *Grabhapala Rasa* in the case of growth retarded symptoms of pregnancy. The results were statistically significant in all the subjective parameters; biparietal diameter ($P < 0.01$), head circumference/abdominal circumference (AC) ($P < 0.1$), femoral length/AC ($P < 0.01$), fetal weight ($P < 0.02$), volume of amniotic fluid ($P < 0.01$), maternal weight ($P < 0.01$), and maternal AC ($P < 0.001$).[9]

Table 1: Studies on the role of Ayurveda in pregnancy-related problems (*n*=6)[9-14]

Authors	Journal	YOP	Study type	Methodology and setting	Major findings
Dayani *et al*.[9]	International Journal of Ayurvedic and Herbal Medicine	2015;5:1-9	Clinical trial (Randomized)	60 pregnant women/ANC Clinic of IPGT and RA Hospital. The group was equally divided into 30 subjects for the control and trial group. The control group was treated with compound consists of *Amalaki*, *Godanthi*, and *Grabhapala Rasa* in powder form with a thrice daily dose of 1.5 g equally divided into three parts with lukewarm water for 12 weeks. The trial group was administered with *AtiBala* with a thrice daily dose of 9 g equally divided into three parts with lukewarm water for 12 weeks	The subjects were treated for GRS. Physical parameters such as uterine height, maternal weight and AC and USG parameters such as BPD, AC, FL, HC, and AFV were assessed. Significant observations were made in the trial group with respect to maternal weight, maternal AC, and fetal weight, AFV, FL/AC, HC/AC, and BPD
Arankalle[10]	Journal of Ayurveda and Holistic Medicine	2014;2:1-10	Clinical trial (open)	Setting – Dharmartha Ashtang Ayurveda Hospital, Pune, Maharashtra. 35 subjects with anemia during pregnancy were administered with *Dadimadi ghrita* with a dosage of 10 ml orally, at morning, empty stomach with a cup of warm water for 30 days	Relief of anemia was observed among 16 subjects up to 51-75% followed by 8 subjects up to 76-100% and 11 subjects up to 26-50%. Elevation of Hb g% was observed among 15 (42.86%) subjects up to 1 g%, in 10 (28.57%) subjects up to 1.5 g%, in 5 (14.28%) subjects up to 0.5 g%, more than 2 g% in 3 (8.57%) subjects
Deepa *et al*.[11]	International Journal of Ayurvedic Medicine	2012;3:170-6	Clinical trial	Setting - OPD, Department of Prasuti Tantra, Sir Sunderlal Hospital, BHU, Varanasi. 55 subjects constituted the trial group and were administered with "*Garbhpal Ras*" 120 mg twice daily with milk and 3-4 "munakka" (dried form of *V. vinifera*) as *anupan* and folic acid 5 mg/day. 39 subjects constituted the control group and received routine medication of folic acid 5 mg/day and B-complex and additionally a combination of pyridoxine and doxylamine succinate was advised to patients as per need. The patients were followed up at 15 days interval up to 3 follow-ups from 2nd month onward. Final lab investigations were made on the 9th month of gestation	At the end of the study, reduction of nausea - 96.36% (initial vs. final follow-up – χ^2=14.565, P<0.01) in TG and 84.62% (initial vs. final follow-up – χ^2=5.183, P<0.05) in CG. Similarly, reduction of vomiting - 100% (initial vs. final follow-up – χ^2=7.165, P<0.01) in TG and 87.18% (initial vs. final follow-up – χ^2=1.524, P>0.05) in CG

(Cond...)

Table 1: *(Cond....)*

Authors	Journal	YOP	Study type	Methodology and setting	Major findings
Rupapara *et al.*[12]	Ayu	2013;34:276-80	Clinical trial	22 patients selected from the outpatient department of *Stree roga* and *Prasutitantra* (Obstetrics and Gynecology), Gujarat Ayurveda University, were randomly divided into two groups; Group A (*n*=12) *Pandughnivati* two tablets of 500 mg thrice daily and Group B (*n*=10) *Dhatrilauhavati* one tablet of 500 mg thrice daily	On comparison, a significant level of improvement was observed in Group B (*Dhatrilauhavati*) in terms of subjective and objective parameters than Group A (*Pandughnivati*). In Group B, results observed were highly significant (*P*<0.001) in pallor and dyspnea. The results in fatigue, palpitation, anorexia, leg cramps were significant (<0.05). Hb%, TRBC, PCV were slightly increased, and TIBC was decreased in Group B, whereas no result was observed in other objective parameters
Roy and Dwivedi[13]	Ayu	2014;35:283-8	Clinical trial	58 cases of pregnant women were selected by simple random sampling between 4th and 7th months of pregnancy with clinical diagnosis and laboratory confirmation of iron deficiency anemia. 500 mg tablets of *Dhatrilauha*, in two divided doses, with normal potable water, was administered after food for 45 days with three follow-ups, each of 15 days intervals. The study was carried out at the OPD of Prasuti Tantra, Faculty of Ayurveda, Sir Sundarlal Hospital, IMS, BHU, Varanasi, Uttar Pradesh, India	*Dhatrilauha* showed statistically significant (*P*<0.01) improvement in the majority of sign and symptoms. The improvements in subjective parameters include weakness, fatigue, palpitation, breathlessness, heartburn, pallor, constipation. Similarly, the objective parameters such as Hb, RBC, hematocrit, mean corpuscular volume, mean corpuscular Hb concentration, RBC distribution width, mean platelet volume, serum iron, and TIBC showed statistically significant results
Ramadevi *et al.*[14]	International Journal of Research in Ayurveda and Pharmacy	2014;5:708-12	Clinical trial	50 pregnant women qualifying the diagnostic criteria of iron deficiency anemia (*Pandu roga*) were selected from the OPD and IPD of SDM Ayurveda Hospital, Udupi, Karnataka. These subjects were administered with 500 mg of *Dhatri Lauha* tablet thrice a day orally for 4 weeks	*Dhatri Lauha* showed significant improvement in subjective and objective parameters of the study subjects. The subjective parameters included weakness, fatigue, dizziness, palpitation, exertional dyspnea and tastelessness. The objective parameters include Hb g%, RBC, PCV, MCV, MCH, and MCHC

IDA: Iron deficiency anemia, TRBC: Total red blood cell, MCV: Mean corpuscular volume, MCH: Mean corpuscular hemoglobin, MCHC: Mean corpuscular hemoglobin concentration, PCV: Packed cell volume, TIBC: Total iron binding capacity, Hb: Hemoglobin, BPD: Biparietal diameter, AC: Abdominal circumference, FL: Femoral length, HC: Head circumference, AFV: Volume of amniotic fluid, OPD: Outpatient department, GRS: Growth retarded symptoms, *V. vinifera: Vitis vinifera*, TG: Treatment group, CG: Control group, RBC: Red blood cells, IPD: Inpatient department

CRITICAL APPRAISAL ON THE ROLE OF AYURVEDA IN MATERNAL HEALTH AS PER ABOVE STUDIES

Ayurveda, the classical medical doctrine, has its own approach in describing the concepts of maternal health. It has also its own approach of managing conditions relevant to pregnancy, childbirth, and post-partum care. It has its own approach regarding conception, antenatal care, embryology, and management of complications arising due to pregnancy, management of abortion, normal delivery, and post-partum care. Similarly, Ayurveda has got specific approaches for the vitiated breast milk and management of child after drinking the vitiated milk.[8,23-25] In Ayurveda, the concept of eugenics is called as *Supraja,* and there are prescribed guidelines for this in Ayurveda.[25] When it comes to management of pregnancy, Ayurveda lays strong emphasis on the management of *Vata dosha* (one of the three humors described in the classical treatises of Ayurveda). Through various therapeutics and regimens and principles of Ayurveda, the *Vata dosha* is pacified well in advance for a fruitful pregnancy outcome. All through the pregnancy, Ayurveda lays emphasis on *Vata Anulomana* (ensuring that the flow of *Vata* is unobstructed and in the right direction). Furthermore, it has been observed that women who are given therapies for the management of vitiation of *Vata* have surprisingly easy pregnancies and deliveries compared to those who do not.[25] Moreover, Ayurveda describes certain diseases which are due to the state of pregnancy and are peculiar to pregnancy. These are called as *Garbhopadravas* (complications due to pregnancy) and include conditions such as nausea, anorexia, vomiting, fever, edema, anemia, and diarrhea.[26] Acharya Kashyap, one of the proponents of Ayurveda, opines that proper management of *Garbhopadravas* is of paramount importance for the mother and the child as well.[27]

Anemia is one of the most common complications of pregnancy and contributes directly or indirectly to 20% of deaths in third world countries.[28] In Ayurveda, anemia during pregnancy is termed as *Garbhini pandu* and primarily accrues to *Rasa Dhatu* (one of the seven tissues described in Ayurveda) vitiation. According to Ayurveda, during pregnancy, *Rasa Dhatu* has got three times more responsibilities than in normal individuals. It becomes responsible for the nourishment of three factors; fetus, breast, and the pregnant woman. Due to this stress on *Rasa Dhatu* during pregnancy, there are more chances that the pregnant woman gets affected with *Garbhini pandu.*[28] For the management of *Garbhini pandu,* several therapeutics have been proposed in classical treatises of Ayurveda, of those few have been clinically tested and are reviewed in this study. *Dadimadi ghrita*, as a hematinic (anti-anemic drug), acts by increasing the level of Hb and by reducing *Pandutva* (faintness of nails, eyes and skin), *Pindikodveshatana* (pain in calf muscles), *Hritspanda* (increased heart rate), *Akshikutashotha* (swelling around eyes), and *Klama* (fatigue).[10] *Dhatrilauhavati*, another hematinic, tested and proved to be significantly effective in reducing anemia. It is composed of Lauha Bhasma, which is an iron supplement and has *Deepana* (stomachic) property that leads to proper metabolism and *Dhatu poshana* (tissue nourishment). Amalaki (*E. officinalis* Gaertn.) and Amruta (*T. cordifolia* Wall. ex Sringe.) help in the nourishment of tissue and are supportive for the absorption of iron. Yastimadhu (*G. glabra*) has *Shonitasthapana* (hemostatic and coagulative) property. The cumulative effects of all the ingredients lead to correction of metabolism, iron absorption, and improved blood formation thereby correction of anemia.[12] In addition, to above-mentioned drugs, *Punarnavadi Mandura* has been studied extensively for its hematinic properties and is currently in use at community level supplemented under National Rural Health Mission in India. It is now a part of the Accredited Social Health Activist (ASHA) - A community health volunteer drugs kit and is freely available to all the pregnant women.[29,30]

Nausea and vomiting are the common symptoms affecting 70-85% of women during pregnancy. The Ayurvedic formulations may have a good impact on nausea and vomiting induced due to pregnancy. *Garbhpal Ras* through its active ingredients helps immensely in reducing the emesis during pregnancy. The main ingredients responsible for this effect are Shunthi (*Z. officinale*), Dhanyak (*C. sativum*), and Ela (*E. cardamomum*). The role of Shunthi in alleviating emesis during pregnancy is well-known.[31-33] Similarly, *Dhanyak*[34] and Ela[35] have a similar effect which is the main reason of the antiemetic effect of *Garbhpal Ras*.

Growth retardation during pregnancy or intra-uterine growth retardation is responsible for low birth weight babies and at least 60% of the 4 million neonatal deaths occurring worldwide.[36] Some Ayurvedic formulations may exhibit *Garbha Sthapaka* (maintenance of pregnancy) and *Garbha Vruddhikara Prabhava* (fetal growth promotion) properties that can address growth retardation during pregnancy. One of such drug is AtiBala (*A. indicum*) which is well-accepted as a nourishing and strength promoting agent during pregnancy. Furthermore, it has *Rasayana* (rejuvenative) and fetal growth promoting properties that invariably helps in proper growth of the fetus during pregnancy.[9]

CONCLUSION

Ayurveda, the science of life, has different types of therapeutic regimens that can offer a better solution to maternal health problems. Many of those therapeutic agents that can offer a better solution to pregnancy-related problems are delineated in this review. The important limitation of this study is that it could not explore the role of Ayurveda, both therapeutics and principles, in other two important components of maternal health; childbirth and post-partum care. Hence, studies need to be conducted in these two important aspects of maternal health to find out effective solutions to the

problems-related to these areas. Furthermore, different types of hematinics (anti-anemic drugs) are available in Ayurveda, which can effectively be used for iron deficiency anemia during pregnancy. Currently, *Punarnavadi Mandura* is being promoted as a drug of choice for combating maternal anemia in the community and is a part of ASHA drugs kit. Several trials have been carried out using drugs for maternal health problems which need to be standardized and used to address such huge public health problems in the community. Non-availability of research publications in this clinical area may be an indication that research in this clinical area is limited, or the findings are not properly disseminated for the scientific community hence necessary steps need to be taken in this direction. Furthermore, the role of apex Ayurveda institutions in the country is indispensable in this direction. Given the maternal health situation in the country research on the role of Ayurveda in maternal health seems timely and rational.

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Source of Support: Nil. **Conflict of Interest:** None declared.