



Pregnancy induced hypertension (PIH) management: A concept analysis

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Abstract

Background: There is no single definition of PIH as well as its management. As a result, many approaches have been introduced such as Non-Pharmacological and Pharmacological. Despite the ambiguity of definition of PIH and its management, understanding it is crucial in the reduction of maternal and neonatal morbidity and mortality.

Methodology/methods: Walker and Avant's framework was used to analyze the concept and the related literature published between 1990 and 2019 was reviewed. A systematic review of a total of 66 papers was done. Articles that had information on PIH and its management were reviewed.

Results: The main antecedents of PIH were identified which are, stressors in the environment which may be physiological, psychological or socio-cultural, patient's age is also included, number of pregnancies, the educational level, religion, and employment. They may also include maternal characteristics such as anaemia, cardiovascular conditions, endocrine disorders such as diabetes mellitus. Environmental characteristics for example, presence of services as well as distance, accessibility of the health care, cost of health care services, staffing and staff attitudes and cultural practices.

Conclusion: A full understanding of the concept of PIH management will help in standardization of tools used to measure and monitor PIH management with the intention of curbing effects of PIH. A framework for the management of PIH will enhance transparency in reporting PIH management.

Keywords: Pregnancy induced hypertension, perinatal outcomes, management, maternal mortality, neonates

Introduction

PIH can be referred to a type of increased blood pressure of greater or equal 140mmHg that is associated with excess protein in urine or may not have elevated amount of protein in urine (that is more than or equal to 300mg over a 24 hour period) which begins at twenty weeks of conception, however it can clear up in 12 weeks postnatal (watanabe *et al.*, 2014). It also refers to a new onset of excessive protein in urine for the first 24 hour period in women who are hypertensive and who do not have excess protein in urine before 20 weeks of gestation (Watanabe *et al.*, 2013) [23].

Pregnancy induced hypertension (PIH), is a form of high blood pressure in pregnancy and it is one of the major contributing factor of morbidity as well as death in women with pregnancy in Zimbabwe. The prevalence of PIH was found to be 19.4% at Harare Central Hospital. It was revealed that women with PIH were at a high risk of adverse pregnancy outcome than those without PIH. Furthermore, the prevalence of pre-eclampsia was 1.7% and that of eclampsia was 0.3% (Muti *et al.*, 2015). The incidence of PIH in the world ranges from 3% to 8% of all pregnancies; in USA, it affects from 2% to 5% of pregnancies (Hermes *et al.*, 2012). According to Dasar (2007) [6] in Indonesia, PIH is one of three major causes of maternal morbidity and mortality of which its incidence was around 12.7% (Sirait, 2012) [20]. Globally, an estimated 292,982 maternal deaths

occurred in 2013. Among this global burden, 85% (245,000) occurred in sub-Saharan Africa (56%) and southern Asia (29%). More than 70% of maternal deaths are due to five major complications: haemorrhage, infections, unsafe abortion, obstruction, obstructed labour and hypertensive disorders of pregnancy, including preeclampsia and eclampsia (WHO, 2012). In addition incidence of preeclampsia in Tanzania, which is a Sub-Saharan African country, was found to be 1.7% (Ajah *et al.*, 2016). Therefore, this clearly shows that there is limited literature on PIH in developing countries particularly Southern Africa. The majority of maternal deaths (61%) occur in the postpartum period and more than half of these take place within one day of delivery (Wagnew *et al.*, 2016) [21]. While, causes of PIH is not clear, there are some factors which increases the likelihood of PIH and these factors include age, that is first pregnancy at a young age, women who get pregnant at the age below the age of 20 and those aged above 40 years, pregnant women who already have kidney condition (Barra *et al.*, 2012) [2]. There are many attributes that have been reported to be related to PIH such as, family aggregation, race, smoking, socioeconomic level, diet, season and climate quite apart from the geographical area (Sajith, *et al.*, 2014) [18].

Aim: To clearly give an explanation of characteristics of

PIH so as to distinguish it from ordinary and holistic usage of the concept.

Methods

The researcher utilized Walker and Avanti's eight-step concept analysis technique. The steps include the following: choosing a concept, determining the aim of analysis, determining all uses of the concept, identifying the defining attributes, determining a model case, identifying additional cases, identifying antecedents and results, and defining observed referents. The study reviewed literature from various scholars so as to fully validate the concept. The search words used in the research are: PIH, PIH management and perinatal outcomes. More emphasis was on authentic sources. The inclusion criteria used was (1). Research papers from the maternal health field (2). The language for the study is English, (3). Concept analysis papers (4). Studies carried-out mainly focusing on PIH management of any design. A total 500 articles were used. These were reduced to 51 through checking their relevance to the concept. Through content and thematic analysis, codes were merged in relation to the 8 iterative steps in Walker and Avanti's model.

Data sources

The following search engines were used as data sources: www.opendoar.org, Google scholar and PubMed search items including Pregnancy Induced Hypertension and perinatal outcomes.

Study Selection

Literature search was done to determine whether PIH has been defined or described as well as determining any variations in definitions. Definitions and description of PIH were classified into themes that shared similar characteristics, sentiments or views.

A literature search of 60 articles was conducted between the years 1999 to 2016. Out of the 60 articles, 51 articles were selected to contribute towards this concept paper.

Results

Definitions

Robinson *et al.*, (2005) ^[17] defined Pregnancy induced hypertension as women having diastolic pressure of >140 mmHg two readings 4 hours apart, or a single reading of diastolic >110mmHg after 20 weeks of pregnancy. Sajith *et al.*, (2014) ^[18] stated that PIH is divided into three major phases. The first as described by Sajith is severe hypertension which results in high blood pressure that exceeds 140/90mmHg earlier than 20 weeks pregnancy, early pregnancy or persist after beginning. The next stage is gestational hypertension which appears following 20th week of pregnancy and resolve after giving birth. The final stage is pre-eclampsia that has both persistent and gestational hypertension which leads to serious condition for example eclampsia subsequent to 20th week of pregnancy). However, Watanebe *et al.* (2013) ^[23], classified PIH into categories namely, Preeclampsia with elevated protein in urine above 300 mg for the first 24 hour period that appear initially after 20 weeks of conception, although both symptoms may disappear at 12 weeks postpartum and

eclampsia which they referred to as the beginning of seizure in women with PIH and this is not triggered by other factors. The convulsions are extensive and may emerge earlier than, through, or subsequent labor.

The variation in definitions of PIH has also contributed to different approaches in the management of PIH. According to Sibai, (2019) ^[19], PIH management is based on the conditions of the pregnant women, such as; management of those without severe features for example, suspected abruptio placentae, worsening maternal or fetal conditions, labor or pre-mature rupture of membranes at ≥ 37 weeks, the patient must be allowed to deliver. This depends on the gestational age and foetal status and development of severe diseases. He also approached management of pre-eclampsia with severe features such as eclampsia, stroke, non-moveable fetus at < 20 weeks or ≥ 34 weeks and fetal death, under these conditions the women should be stabilized and deliver with close monitoring during and after delivery. He also proposed that, persistent symptoms and uncontrolled hypertension elevated liver enzymes and low platelets, the women should deliver ≤ 48 hours.

The main ultimate management of PIH is to let delivery take place. As a result, women with PIH at 37 weeks and above may deliver most probably due to severity and preterm with severe condition (Sarsam, 2007)

Brichant *et al.*, (2010), argued that the prevalence of PIH is low in less than 24 weeks of pregnancy. In general, termination of pregnancy is preferred to this faction (Brichant *et al.*, 2010). Strict control and management of blood pressure, maternal and foetal parameters are essential element of management of PIH. The utilization of diuretics to avoid preeclampsia as well as its adverse outcome cannot be recommended (Churchill *et al.*, 2007) because this practice became contentious when concerns were raised that diuretics might decrease the plasma volume in women with pre-eclampsia, thus raising the risk of undesirable outcomes on the mother and the child, mainly the fetal development

However, there has not been any attempt by researchers or professionals on the definition of PIH management. Although there is no single definition for PIH management, its meaning should be understood. This makes PIH management a key factor in nursing and an important determinant for the prevention of PIH and its adverse outcomes. This paper seeks to critically analyze the concept of PIH management. A full insight of this concept will, considerably enlighten people on what it is and it will also improve service delivery and perinatal outcomes.

There are a number of publications on the definition of PIH as well as approach in terms of its management. However, there is no single definition of what PIH management is and what it is not. As a result, researchers have defined PIH as, high blood pressure during pregnancy. It is also known as gestational hypertension (Barra *et al.*, 2012) ^[2].

Importance and uses of the concept

PIH and its management are critical and should be essential part of nursing concern for continuous improvement and enhanced fetal outcomes (Gupta *et al.*, 2014) ^[8]. There is a strong relationship between contextual factors and patient positive outcomes (Westwood, 2003). A full appreciation of the concept of PIH and perinatal outcome in enhanced person-centered care and overall efficient care.

Individualized care takes cognizance of the distinctiveness of values, needs and prospect of persons with regards to their own health (Flagg, 2015). Management of PIH will result in the reduction of pregnancy complications which may threaten maternal and fetal health (Nahar *et al.*, 2015)^[13]. PIH Management will also reduce risk of brain edema, acute heart failure, stroke, and acute renal failure which is also increased due to the pathologic changes brought by PIH (Nahar *et al.*, 2015)^[13].

PIH management is crucial in determining measures that can be taken to curb PIH effects such as death of the neonates even the pregnant women. For example, in women with PIH, a normal diet without salt restriction is advised, particularly close to delivery. Olsen *et al.*, (2017) argued that, Salt restriction may lead to small intravascular volume. In addition, calcium supplementation (≥ 1 g/day) is associated with a significant reduction in pre-eclampsia risk, particularly for women on low-calcium diets.

PIH management concept will assist in determining proper dosage, timing and duration of vitamin D complement that will help in the prevention of PIH. Purswani *et al.*, (2017)^[16] argued that, clinical trials have not shown a valuable effect of vitamin D supplementation on preeclampsia prevention, but the dose, timing, and duration of supplementation should be investigated in future research (Purswani *et al.*, 2017)^[16]. Magro-Malosso *et al.*, (2017)^[11] also noted that, aerobic exercise for 30 to 60 minutes twice a week throughout pregnancy can decrease PIH risk considerably (Magro-Malosso *et al.*, 2017)^[11].

Step 4: Determine the defining attributes or characteristics
Walker and Avant, (2005)^[22] defined attributes as traits or characteristics of a concept and these help in differentiating a particular thought from any other associated concept or theory. Therefore the attributes of pregnancy induced hypertension are being pregnant, lack of adequate knowledge of PIH, age, educational level, period of gestation, number of children with knowledge of PIH in antenatal mothers (Mulud *et al.*, 2018)^[12]. Lack of exercises is a major cause of hypertension.

Age

It has been realised that PIH usually affect young women with the first pregnancy, pregnant women who are younger than 20 years as well as those pregnant women who are above 40 years (Pswarayi, 2010 and Mulud *et al.*, 2018)^[12].

Obesity

Hypertension disorders including pre-existing hypertension and pregnancy induced hypertension are common in women with excessive weight. Obesity is defined as an abnormal accumulation of body fat. Obesity happens when the energy intake repeatedly exceeds energy expenditure. Its exact cause is unknown but however genetic, metabolic endocrine, psychological and cultural factors are implicated. According to World Health Organization (WHO), Obesity is defined as body mass index (BMI) of 30kg per square meter or more (Ogden *et al.*, 2006)^[14]. Prevalence of obesity is rising to epidemic with proportions around the world which include women who are of child bearing ages (Ogden *et al.*, 2006)^[14]. Obese women are at risk of developing Pregnancy Induced Hypertension. One large cohort study implied that in relative non- obese women, there was 1 excess case of

PIH per 10 moderately obese women and 1 per 7 severely obese women. (Robinson *et al.*, 2005)^[17]

Obesity causes more complications in pregnancy and child birth. Maternal obesity cause adverse outcomes resulting in many maternal complications (Gestational diabetes mellitus, hypertension, and preeclampsia), labour and delivery complications, fetal and neonatal death (Cnattingius *et al.*, 1998)^[5], birth defects-especially Neural Tube Defects (NTDs) (Watkins *et al.*, 2003)^[24], and delivery of Large-For gestational Age(LGA) infants (Beaten *et al.*, 2007; Cedregen, 2004).

An individual with Obesity has a high probability of having pre-eclampsia. The precise means by which obesity is related to increased threat of pre-eclampsia is not entirely known. Probable explanations comprise of increased stress as a result of hyper-dynamic circulation related to obesity as well as dyslipidaemia or increased oxidative stress.

PIH and maternal nutrition

According to the World Food Programme (WFP, 2009), approximately 870 million in the world go through persistent malnutrition while almost 60 percent are girls.

Lack of physical activity

Most of urban dwellers have limited time for physical exercise as compared to rural people and as such, exposing them to the risk of obesity, cancer, cardiac conditions and diabetes. Literature indicates that globally there is difference in physical activity levels between males and females. In addition, adolescent girls in low developing nations and middle-income nations put less value in physical activity and hence they are less active (WHO, 2011)^[25].

Consumption of Alcohol

The consumption of alcohol has increased recently and many cases recorded in developing nations. However, in quite number of societies, women are perceived to drink less as compared to men. As such, the recognition and treatment of complications related to alcohol in women is inadequate while most of the programmes for treatment of alcohol is biased towards men (WHO, 2012)

Smoking cigarette

There has been an increase in smoking rates among men particularly among youth and young women in many regions worldwide. According to WHO (2012), the percentage of female smokers will increase from 12% to 20% in 2010 and 2025 respectively. Other factors include: Lack of adequate knowledge of PIH, Multiple Pregnancies, Genetic factors that is family history of hypertension, Women with multiple foetuses, gestational diabetes, pregnant women with pre-existing hypertension that is history of chronic hypertension, pregnant women with pre-existing renal disease and high salt diet is major contributing factor of hypertension (Singh and Srivastava, 2015).

Model case

Chipo, a 19 year old woman who lives with her husband and two children works at a farm in a rural set up and is 24 weeks pregnant and weighs 65kgs. Chipo and her husband are known alcoholics and she is ever mobile. She succumbed to peer-pressure and started smoking at the age of 15. Despite the effort that Chipo puts towards farming,

she cannot afford to buy enough food for the family hence she is not able to have a balanced diet as a pregnant woman. She subsidized her income buy selling vegetables. For several years Chipo also suffered from diabetes with poor drug compliance because she cannot afford to buy medication. She also suffered from persistent headache and usually treats herself using traditional herbs. When she visits the local clinic she is normally given paracetamol and returns home. Due to poor remuneration from the farm owner, Chipo and her family sometimes could eat sadza with salt only.

Chipo spent most of her time in the field resulting in her missing antenatal visits. Chipo's mother and grandmother are known hypertensive patients and they are on medication. However, Chipo's husband is not supportive and he is also abusive and usually spends more than three weeks without coming home and thus despite Chipo's condition she does all the house chores including caring for the children.

Analysis

From the above model case all the attributes and characteristics of PIH and its management are seen. Attributes for instance, lack of enough income, lack of knowledge, smoking, alcohol consumption, obesity which affect BMI, pre-existing conditions, history of hypertension, diabetes mellitus and stress are clearly seen.

Contrary case

Mrs. Brown who is 26 years old and is 28 weeks pregnant and she also is a bank tailor. She earns a lot of money and she has a big house in the low density suburbs. She has two children and her husband is a doctor. She takes a balanced diet and conduct exercises on regular basis. She is not involved in smoking or drinking alcohol. There is no history of chronic illness in her family. She keeps her ANC visits.

Analysis

In a contrary case all the attributes of the concept cannot be included (Walker & Avant, 2005) [22]. Mrs Brown is constant in terms of, food, shelter and emotional stability. She is capable of achieving her goals and desires without any challenges. From the above case Mrs. Brown is a rich woman and is able to manage her condition.

Identify antecedents and consequences

Walker and Avant (2005) [22] defined antecedents as evidence and conditions which occur prior to the commonness of the concept and often linked with the prevalence of the same concept. Through a detailed review of literature, the following antecedents were identified which are, environment stressors which include the physiological aspect, and as well of comprise socio-cultural, these have the ability to disrupt the steadiness of client's health status. The present study's environmental stressors that can cause PIH constitute three phases which are, socio-demographic (Mulud *et al.*, 2018) [12], maternal features and environmental features for example, affordability, availability, accessibility, as well as staffing and staff's way of think and cultural practices.

Although healthcare services are affordable, the socio-cultural status of the women in developing nations results in limited access to healthcare resources as well as health information. Thus majority of young women are not able to

care for themselves and they do not have capacity to make their own choice pertaining to their health care as well as their children without clear authorization from their spouses as well as relatives (WHO, 2010) [25, 26].

Consequences

The most well-known reason for maternal death and neonatal morbidity is PIH and it has contributed to almost 5% to 8% among women who are pregnant (DeCherney *et al.*, 2006) [7]. The effects of PIH also include neonatal thrombocytopenia, and this is referred to as reduced platelet level of about 150. 000/uL (Burrows and Andrew, 1990) [4]. Thrombocytopenia is often found at birth or during the initial 2 to 3 days after birth and may resume at 10 days in many cases (Koenig and Christensen, 1999) [9].

The pathophysiology of PIH in relation to neutropenia has not been clearly understood. One possible mechanism could be that PIH can result in utero-placental deficiency, alter foetal bone marrow production of the myeloid lineage shown by a reduction in the production of neutrophil (Hauth *et al.*, 2000).

The term HELLP syndrome refers to haemolysis, elevated liver enzymes and low platelet count, another form of persistent preeclampsia that contribute to an increase in neonatal as well as maternal illnesses (Leeman and Fontaine, 2008) [10].

Severe preeclampsia is rarely accompanied by short-term loss of vision and this probably last a few hours to more than seven days (ACOG, 2002)

Tubular necrosis may cause acute renal failure which is linked to Disseminated Intravascular Coagulation (DIC) and abruptio placentae (Yucesoy *et al.*, 2005).

In addition, patients with persistent hypertension have arrhythmias, as well as malignant ventricular arrhythmias (Xiong *et al.*, 2007) [27].

Empirical referents

Empirical referents of a concept are classes of actual concept that by their existence demonstrate the occurrence of the concept (Walker & Avant, 2005) [22]. The last step of a concept analysis according to Walker and Avant (2005) [22] is the empirical referents. Thus empirical referents for PIH indicates that the treatment of PIH include, non-medical interventions as well as medical interventions that involve interventions like reducing weight changes in diet, caseation of smoking and prevention of alcohol consumption. Medical intervention includes the use of anti-hypertensive drugs depending with severity of PIH. These are especially useful in future instrument development for research and evaluation of PIH management. It also improves health outcomes for clients for instance, reduction in maternal and neonatal morbidity and mortality, increased uptake of nursing services; high levels of client engagement in health care and efficiency in service delivery.

Discussion

This paper has explored and consolidated the existing knowledge on PIH management. The paper dealt with the various fragments of knowledge and experiences on PIH management in an effort to provide a combined and comprehensive meaning of PIH management. It is evident from the explorations that PIH management cannot be defined holistically without the input of PIH patients. This

then means that there is need to address frequent nursing practice errors and meet the rising demand of services and limited resources.

Conclusion

The definition of PIH management provided by the authors will aid in enhancing understanding of the concept of PIH management. A framework for the management will enhance transparency in reporting PIH management. This paper managed to define PIH management and its attributes.

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