

Ergonomic Stressors Among Pregnant Healthcare Workers

Impact on pregnancy outcomes and recommended safety practices

*Frincy Francis,¹ Sheeba E. Johnsunderraj,¹ Divya K. Y.,² Divya Raghavan,¹ Atiya Al-Furgani,¹ Lily P. Bera,³ Aniamma Abraham⁴

ABSTRACT: Workplace environment can have a considerable impact on the physical, psychological and maternal health of pregnant healthcare workers. This article aimed to summarise the impact of work-related ergonomic stressors on pregnancy outcomes for healthcare workers, along with potential interventions to resolve these stressors. A narrative review analysis using the Pearl Growing Strategy was conducted between February 2019 and June 2020 to identify English-language articles published between 2000 and 2020. A total of 89 studies were identified from the SCOPUS (Elsevier, Amsterdam, Netherlands), MEDLINE® (National Library of Medicine, Bethesda, Maryland, USA) databases and Google Scholar (Google LLC, Menlo Park, California, USA). The results indicated that poor work-related ergonomics had detrimental effects on pregnancy outcomes, resulting in spontaneous abortions, preterm delivery, low birth weight babies and infertility. Policymakers and employers should conduct ergonomic assessments and implement appropriate practices to ensure the safety of pregnant healthcare workers.

Keywords: Healthcare Workers; Physical Ergonomics; Pregnancy Outcomes; Occupational Health; Occupational Exposure.

THE WORLD HEALTH ORGANISATION ESTIMATES that there are approximately 34.4 million healthcare workers worldwide including doctors, nurses, pharmacists and other types of community healthcare providers, of which an increasing proportion are female.^{1,2} Despite recent improvements in workplace technology and practices, occupational hazards remain an important cause of morbidity and mortality worldwide.³ In particular, healthcare professionals have a high prevalence of musculoskeletal disorders, ranging from 50–90% among nurses to 86.7% among rectovaginal surgeons, 67% among orthopaedic surgeons and 91% among sonographers.⁴

Ergonomics refers to the study of factors likely to affect interactions between an individual and their working environment.^{5,6} Approximately 59 million healthcare workers around the globe are exposed to ergonomic hazards daily.^{2,7} According to the International Ergonomics Association, ergonomics is defined as a “scientific discipline that applies theory, principles, data, and methods to optimise human well-being. It evaluates tasks, jobs, environments, and systems to make it compatible with the needs, abilities, and limitations of people”.⁸ The application of ergonomic principles in a workplace had been found to prevent musculoskeletal disorders and increase both productivity and job satisfaction among employees.^{9,10}

Certain ergonomic hazards are either created or exacerbated by pregnancy.^{11,12} Adverse pregnancy outcomes have been linked to poor working conditions including prolonged standing, lifting heavy objects, long working hours and psychological stress.¹² Moreover, poor ergonomic practices often exaggerate existing discomfort, resulting in increased rates of work absenteeism, sick leave and a lack of motivation among pregnant healthcare workers.¹³ Appropriate accommodations are therefore necessary to enhance the comfort of pregnant employees and help them to handle work-related stress as well as the innate physical challenges associated with pregnancy.^{12,14} This article aimed to review the available literature concerning the impact of work-related ergonomic stressors on pregnancy outcomes for healthcare workers, along with feasible solutions to prevent and mitigate such risks.

Methods

This narrative review was conducted from February 2019 to June 2020. The primary objective was to highlight the impact of work-related ergonomic stressors on pregnancy outcomes among healthcare workers, as well as to recommend ergonomic interventions to prevent these stressors. The SCOPUS

Departments of ¹Maternal & Child Health and ²Community & Mental Health, College of Nursing, Sultan Qaboos University, Muscat, Oman; ³Department of Maternal & Child Health, College of Nursing, All India Institute of Medical Sciences, Bhopal, India; ⁴Directorate of Nursing, Sultan Qaboos University Hospital, Muscat, Oman

*Corresponding Author's e-mail: frincyshalom@gmail.com

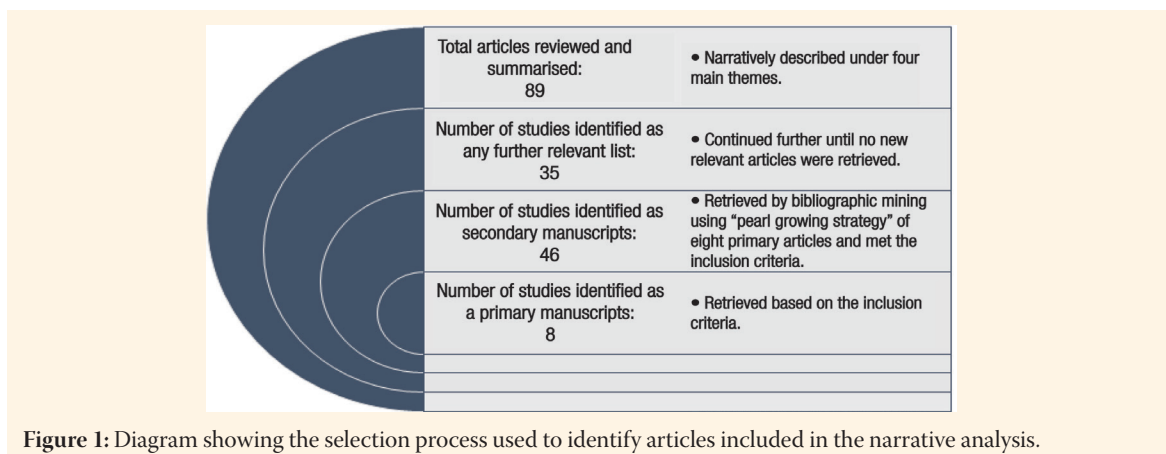


Figure 1: Diagram showing the selection process used to identify articles included in the narrative analysis.

(Elsevier, Amsterdam, Netherlands), MEDLINE® (National Library of Medicine, Bethesda, Maryland, USA) databases and Google Scholar (Google LLC, Mountain View, California, USA) were searched electronically to identify relevant articles for inclusion. To ensure a holistic approach, the following search terms were used: “healthcare workers”, “physical ergonomics”, “pregnancy outcomes”, “occupational safety”, “hospital ergonomics” and “recommendations”.

The inclusion criteria comprised all English-language articles published between 2000 and 2020 reporting the impact of work-related ergonomic stressors on pregnancy outcomes in healthcare workers and pregnancy-specific ergonomic interventions for hospital units. Articles related to pregnant women working in other professions were excluded, as were those published prior to 2000 or written in other languages. All types of articles were deemed eligible for inclusion including experimental studies such as randomised controlled trials and quasi-controlled trials, as well as cohort studies, observational studies and surveys. Case reports, action research studies and qualitative studies detailing conceptual information were also included to emphasise the importance of optimal ergonomic practices for pregnant women.

As the sources of the retrieved articles were highly variable, the literature search was conducted using the Pearl Growing Strategy.¹⁵ This approach was deemed most suitable as the review focused on a specific population (i.e. pregnant healthcare workers). An article extraction checklist listing the inclusion and exclusion criteria was utilised during retrieval in order to confirm the relevancy and appropriateness of each article. A total of eight primary articles were retrieved following the initial screening of titles and abstracts. Subsequently, 46 secondary articles were identified from the reference lists of the primary articles. A further 35 articles were identified via bibliographic mining of the secondary articles. Overall, a total of 89

articles met the inclusion criteria and were included in the narrative analysis [Figure 1].

Although the findings of the literature search were initially compiled according to preconceived themes, these were revised based on data extracted from the articles. Four main themes were therefore applied as follows: (1) ergonomic-related physiological changes in pregnancy; (2) ergonomic stressors and pregnancy outcomes; (3) the psychological impact of ergonomic stressors; and (4) recommended safety practices for pregnant healthcare workers including ergonomic assessment methods.

Results and Discussion

The following section narratively discusses findings from articles related to work-related ergonomic stressors and their impact on pregnant healthcare workers including stressors and activities related to the working environment. In addition, strategies to overcome or mitigate the impact of these stressors are also recommended based on the findings of the literature review.

ERGONOMIC-RELATED PHYSIOLOGICAL CHANGES IN PREGNANCY

A pregnant employee requires additional attention and care due to certain physiological and pathological changes that arise during pregnancy. In particular, gait, balance, spinal curvature and pain alter considerably as the pregnancy progresses.¹⁶ Moreover, various anatomical, physical, psychological and biochemical changes occur in order to ensure haemostasis, meet the increasing demands of the developing fetus and prepare for labour.^{17,18} Such changes also affect the quality of life of the expectant mother.^{19–22}

Backache and waddling gait occur due to increased levels of relaxin and oestrogen hormones, joint laxity, hypermobility and spinal curvature; in turn, this

increases the rate of falls among pregnant women.^{23–26} In the second trimester, several symptoms cease while other physiological adaptations continue.^{23,24,27} Abnormal conditions can cause anaemia, fluid retention and physiological oedema, thereby compressing the nerves and resulting in numbness and pain in the extremities.^{18,19,25} Many pregnant women also experience increased levels of tiredness, varicose veins, back pain, muscular cramps, Braxton Hicks contractions and poor sleep quality.^{26–28} Pregnancy ailments are often exacerbated by the presence of ergonomic stressors at work.¹⁴

ERGONOMIC STRESSORS AND PREGNANCY OUTCOMES

A pregnant employee is more vulnerable to certain occupational hazards, such as radiation exposure (at >100 millirems), infectious bioagents, heavy lifting and prolonged working hours (>12 hours per shift), due to their impact on fetal development.^{29,30} Expectant mothers should therefore be protected from harmful working conditions, especially after the first trimester.³¹ This includes ergonomic stressors related to various negative pregnancy outcomes such as spontaneous abortions, prematurity, low birth weight babies and stillbirths.

Biological and Chemical Agents

A study of 7,500 pregnant nurses working in chemotherapy administration showed a significant increase in the rate of spontaneous miscarriage after handling cytotoxic drugs.³² In addition, exposure to biological agents such as cytomegalovirus, hepatitis B, human parvovirus B19 and rubella can cause birth defects, low birth weight babies, miscarriages and developmental disorders.³³ In particular, seroprevalence rates of cytomegalovirus have been found to be very high among nurses working with immunocompromised and paediatric patients, as well as other healthcare workers in close contact with infected patients or those who provide personal hygiene care like bathing and toileting.³⁴

Ionising Radiation

Sources of ionising radiation such as X-rays and gamma rays can cause infertility, miscarriage, birth defects, low birth weight babies and developmental disorders.³⁰ In a study from Israel evaluating 934 pregnant physiotherapists, the researchers reported a significant association between shortwave exposure and low birth weight babies.³⁵ A prospective cohort study of 1,025 female laboratory technicians found that exposure to radio immunoassay work and radio-labelling at approximately 16 gestational weeks increased the rate of preterm delivery.³⁶ In addition, the risk of major fetal malformations was elevated among workers exposed to organic solvents.³⁶

Overexertion and Heavy Lifting

Several studies have shown that factors such as physical overexertion, irregular working hours and heavy lifting are associated with an increased risk of spontaneous abortion among pregnant women.^{29,31,37} As such, employees should be careful when lifting and manoeuvring objects away from the body as the pregnancy progresses.¹⁶ Lifting heavy weights (>10 kg) during pregnancy shifts the centre of gravity forward, affecting balance and potentially increasing the risk of falling.^{38,39} Moreover, lifting heavy loads also increases the risk of preterm birth.³⁸

An elevated risk of stillbirth and spontaneous abortion related to physical effort, lifting heavy objects and working for long hours without rest has been observed among nursing assistants, aides and other female employees.^{40–42} High levels of physical activity during pregnancy increase the demand for oxygen, reducing fetal nutrition supply and putting stress on the endocrine system. Exhaustion, lifting heavy objects, long work hours without rest and high noise levels (>85 decibels) during pregnancy has been linked to low birth weight babies.^{31,43–46}

Prolonging Working Hours and Standing

Prolonged or irregular working hours have been found to increase the risk of small-for-gestational-age babies, with this risk aggravated by other working conditions including night shifts, prolonged standing, increased noise exposure and high psychological needs with low support.^{47–49} The prevalence of preterm labour among orthopaedic surgeons during their first pregnancies was 11.1%, gradually increasing to 12.5% in second pregnancies and 20% in third pregnancies.⁵⁰ Urologists have also shown an increased risk of premature labour compared to the general population, likely due to prolonged working hours and continuous standing (>3 hours per day).⁵¹

There is also a significant relationship between number of hours worked per week and premature rupture of the membranes.⁵² Overall, 8.8% of women working 40 hours per week report premature labour, which indicates that occupational fatigue caused by prolonged working hours can lead to preterm delivery.^{52,53} Occupational fatigue during pregnancy is also believed to lower capacity to endure pain during vaginal delivery, as well as energy levels, potentially affecting the decision to perform a Caesarean section.⁵⁴

Falls

A retrospective cohort study from the USA found the incidence of falls among employed pregnant women to be 26.6%, of which 13.1% occurred at the workplace and the majority during the second and third trimesters.⁵⁵ Overall, pregnant healthcare workers reported the

fourth highest prevalence of workplace falls, with rates of 7.9% among dentists, physician assistants, pharmacists and doctors, 5.2% among nurses and 1.3% among dental hygienists, technicians and health aides. Certain fall-related risk factors—such as slippery floors, rushing/hurrying and carrying equipment/objects—were found to contribute to 66.3% of workplace falls.⁵⁵ Various obstetric complications such as placental separation, uterine rupture and fetal death can occur due to fall-related trauma; other possible injuries include fractures, strains, sprains and head injuries.⁵⁶

Musculoskeletal Injuries

Musculoskeletal disorders are commonly reported by nurses and this risk is exacerbated in pregnancy, particularly during late gestation.^{57,58} The occupational tasks of healthcare workers can contribute to these injuries, such as the need to manually handle patients, pull and push beds and trolleys and move or hold awkward body positions while performing patient care procedures.⁵⁹ The prevalence of musculoskeletal disorders over a 12-month period was 39% among 200 nurses working at a hospital in Ajman, Saudi Arabia.⁶⁰ Over half of the participants also reported routinely engaging in awkward body positions, working without positional changes and repetitive tasks.⁶⁰ In addition, working in a confined space has been positively correlated with back pain severity at 34 gestational weeks.¹²

Wrist pain has been reported by 90% of sonographers due to the routine use of transducers for scanning, with grip technique and pressure being contributing factors.^{61,62} Muscle strain is aggravated more by pinch grip compared to power grip, as the former technique applies five times more force than the latter.⁶³ An association has also been established between grip strength and muscle function, with lower grip strength increasing the risk of injury and disability.⁶⁴ A longitudinal study assessing the hand grip strength of pregnant women reported a significant reduction in grip strength from the first to the third trimester, a finding attributed to the metabolic, musculoskeletal and hormonal changes which occur in pregnancy.⁶⁵

PSYCHOLOGICAL IMPACT OF ERGONOMIC STRESSORS

All domains of ergonomics are interconnected; for instance, a poorly designed workstation can create stress, thereby altering behaviour which in turn can induce changes in cognitive function and overall performance.⁶⁶ Although workplace ergonomics primarily focus on physical factors, employers should also consider workers' mental workload, creativity and productivity. The relationship between environmental

risks at work and fetal outcomes remains inconclusive. In general, standard working conditions present little hazard to infant health; however, pregnancy may significantly impact maternal psychosocial wellbeing in the workplace.⁴⁶

Supporting employees through skill development and coping mechanisms is therefore an important component of workplace ergonomics. Making suitable adjustments to physical, cognitive and organisational ergonomic domains can help employees to remain efficient during pregnancy. In particular, stress during pregnancy has negative outcomes; as such, psychological assessments and counselling should be performed.⁶⁷ Moreover, previous research indicates an association between poor job control, lack of workplace support and increased levels of workplace stress and the development of depressive symptoms during pregnancy.⁶⁸ Excessive or insufficient workloads, unclear tasks or instructions, poor support and rotating shifts adversely impacts both work quality and pregnancy outcomes.⁶⁹

RECOMMENDED SAFETY PRACTICES

Ergonomic Assessment Methods

Employers can utilise various ergonomic assessment methods to ensure an optimised working environment for their employees. They should begin by identifying risks for work-related disorders that stem from poor ergonomic practices, for instance by utilising the computer-based SONEX system which predicts the development of work-related musculoskeletal disorders and offers preventive measures to improve a worksite's ergonomics.⁷⁰ Subsequently, various available programs are available to provide ergonomic consultations and financial support to obtain ergonomic devices, an effective step in reducing musculoskeletal disorders.⁷¹ One particularly useful approach is heuristic evaluation, a general ergonomics inspection method based on accepted theoretical principles and past design experience which allows employers to either create their own structured evaluation checklist or use existing checklists.⁷²

With regards to physical ergonomics, posture-based analysis can be employed to help identify areas of concern, with higher scores indicative of poor posture due to deviation from a neutral standing position. Specifically, the Rapid Upper Limb Assessment (RULA) provides a swift evaluation of the potential for upper limb disorders, while the Rapid Entire Body Assessment (REBA) considers the intensity of work performed by the whole body to evaluate the risk of musculoskeletal disorders.⁷³ Both RULA and REBA assess specific postures during repetitive tasks.⁷³ Another potential method is the Revised National

Institute for Occupational Safety and Health Lifting Equation (RNLE), an example of a biomechanics-based assessment which determines maximum weight limitations to prevent overexertion injuries related to manual tasks involving pulling, moving, lifting and transferring.^{74,75} Based on the RNLE, a lifting index of >1.0 indicates a high risk of injury.⁷⁴

Conducting regular ergonomics evaluations is necessary to ensure a suitable and safe work environment. Ideally, a task force should be formed to conduct routine ergonomic assessments for the purposes of early risk detection.⁷⁶ While there is currently no published evaluation method specific to pregnant women, the development of such a method would greatly improve the quality of life of pregnant employees. In particular, longer working hours and shift work have major implications for the short- and long-term health of both mothers and their infants.^{47–53} These findings may help inform decision-making on occupational directives or workplace design for the prevention of adverse pregnancy outcomes. Healthcare administrators should plan and conduct awareness programmes regarding the potential impact of ergonomic stressors and poor work posture on employees.⁷⁷ In addition, the ergonomic safety and comfort of pregnant healthcare workers should be prioritised, especially as working conditions are linked to increased rates of sick leave and absenteeism in this population group.⁷⁸

Fall Risk Assessments Among Pregnant Workers

Although fall risk assessments are routinely performed for hospitalised patients, most health institutions do not conduct such assessments for workers. Nevertheless, it is highly recommended that fall risk assessments be provided for pregnant healthcare workers due to the high risk of falling for this population group.⁵⁵ A few examples of fall risk assessment tools for pregnant women include the Obstetric Fall Risk Assessment System, the Maternity Fall Risk Assessment Scale and the Fall Risk Assessment for Perinatal Patients instrument.^{79–81} Such tools can be modified and used to assess fall risk among pregnant healthcare workers.

Potential Preventative Strategies

Several preventative strategies can be used to address ergonomic stressors in pregnant women, such as maintaining ideal posture, taking frequent breaks and avoiding heavy lifting, loud noises and electromagnetic fields.^{46,82} Potential accommodations to address common ergonomic stressors related to adverse pregnancy risks are shown in Table 1.^{31–39,43–46,48,52–56,61,64,65,71,78–100}

Viable solutions to avoid heavy lifting by pregnant healthcare workers include apparatuses to lift and

transfer patients, biomechanical training, larger rooms and additional team members for support during patient transfers.⁸³ In particular, hydraulic or power-operated mechanical lifts should be provided to help lift patients from a bed to a stretcher or a chair, with appropriate training for caregivers to minimise risk of injury.⁸⁴ Implementation of a minimal lifting or no lifting policy in healthcare institutions is not only cost-effective, but also results in greater satisfaction and fewer injuries among nursing staff.^{85,86} According to the American Medical Association, pregnant workers at ≤ 24 gestational weeks may safely lift up to 23 kg repetitively; subsequently, the weight limit should be reduced to 11 kg.⁸⁷ With regards to intermittent lifting, it is safe to lift up to 23 kg, even after 30 gestational weeks.⁸⁷

As the pregnancy progresses, the abdominal muscles stretch to accommodate the growing fetus, especially in the third trimester. Therefore, in order to maintain appropriate body mechanics, workstations should be designed so that the pregnant worker can maintain a reach distance of 38–50 cm. Considering this need for additional space is essential when planning clinical workstations in hospitals.^{88,89} A previous study found that use of a concave desk board while using a computer for 20 minutes helped pregnant women increase muscle activity in their upper right trapezius and decrease muscle activity in the lower back, thus minimising back discomfort in late pregnancy.⁹⁰ Sit-stand ergonomic units and standing desks are also potential solutions for alternating work posture while performing repetitive tasks.^{91,92} Prolonged standing among pregnant healthcare professionals should be limited to <3 hours.⁸²

Anti-slip flooring can help to prevent falls among pregnant workers; similarly, warning signs should be placed near wet or slippery floors by housekeeping staff. Ensuring safety in restrooms is also essential to minimise fall risk. In terms of work attire, pregnant workers should be encouraged to select comfortable work shoes for prolonged standing, with a good base and no laces to reduce the risk of slipping or tripping.⁹³ Finally, the first line of defence in preventing infection, especially when exposed to biological agents such as cytomegalovirus, is adherence to universal precautions like hand hygiene and use of personal protective equipment. It is also essential to minimise the risk of work-to-home contamination by requiring workers to change clothes at their workplace and providing laundry services.⁹⁴

IMPLICATIONS FOR PRACTICE IN OMAN

Globally, the number of female healthcare professionals has increased, especially in medicine.^{1,2} A similar trend has been reported in Oman, with women accounting

Table 1: Impact of ergonomic stressors during pregnancy and recommended practices^{31–39,43–46,48,52–56,61,64,65,71,78–100}

Ergonomic stressor	Risk in pregnancy	Recommended practice for safety
Work shifts (evening/night shifts)	<ul style="list-style-type: none"> • Preterm delivery • SGA babies • Gestational HTN 	<ul style="list-style-type: none"> • Avoid night shifts • Permit convenient shift changes
Prolonged working hours (≥40 hours/week)	<ul style="list-style-type: none"> • IUGR • Preterm delivery • Dehydration • Threatened miscarriage • Instrumental delivery due to maternal exhaustion 	<ul style="list-style-type: none"> • Reassign shifts • Reduce working hours to 6 hours per day
Prolonged standing (≥3 hours)	<ul style="list-style-type: none"> • Decreased fetal growth rate 	<ul style="list-style-type: none"> • Provide sit-stand ergonomic units or ergonomic chairs with footrests • Limit continuous standing to <3 hours
Prolonged bending	<ul style="list-style-type: none"> • Increased back pain 	<ul style="list-style-type: none"> • Provide a chair with minimal rocking facilities to alter the centre of gravity
Overexertion (physically demanding work)	<ul style="list-style-type: none"> • Preterm delivery • LBW babies • Decreased fetal growth rate 	<ul style="list-style-type: none"> • Reduce physical demands in the workplace • Ensure minimal physical strain
Lifting, moving and transferring	<ul style="list-style-type: none"> • Musculoskeletal injuries • Maternal exhaustion • LBW babies 	<ul style="list-style-type: none"> • Provide additional staff support • Install hydraulic or power-operated mechanical lifts • Implement a no lifting policy
Body posture issues (repetitive jobs and awkward positions)	<ul style="list-style-type: none"> • Lower back pain • Pelvic girdle pain • Wrist pain • Muscle spasms • Sprains • Altered grip strength 	<ul style="list-style-type: none"> • Consider a reach distance of 38–50 cm in workstation layouts, particularly in the third trimester • Alternate posture/position every 2 hours • Install concave desk boards for computers
Occupational fatigue	<ul style="list-style-type: none"> • PROM • Preterm delivery • Caesarean section delivery due to maternal exhaustion 	<ul style="list-style-type: none"> • Take a 10-minute break every hour • Provide comfortable rest rooms • Avoid night shifts
Work-related falls	<ul style="list-style-type: none"> • Placental separation • Uterine rupture • Fetal death • Fractures • Injuries 	<ul style="list-style-type: none"> • Conduct mandatory fall risk assessments • Install anti-slip flooring • Place caution boards near wet floors • Wear comfortable shoes
High noise exposure (>85 decibels)	<ul style="list-style-type: none"> • LBW babies 	<ul style="list-style-type: none"> • Avoid loud or noisy environments
Exposure to biological and chemical agents	<ul style="list-style-type: none"> • Infertility • Birth defects • Decreased fetal growth rate • Impaired fetal brain development • Preterm delivery • LBW babies • Miscarriage • Developmental disorders 	<ul style="list-style-type: none"> • Implement mandatory universal precautions (i.e. handwashing, wearing PPE, etc.) • Minimise the possibility of work-to-home contamination
Exposure to ionising radiation	<ul style="list-style-type: none"> • Miscarriage • LBW babies • Preterm delivery • Birth defects 	<ul style="list-style-type: none"> • Wear appropriate PPE
Stress	<ul style="list-style-type: none"> • Decreased psychological wellbeing • Depression • Gestational HTN 	<ul style="list-style-type: none"> • Conduct routine psychological assessments and counselling sessions • Ensure a supportive work environment

SGA = small for gestational age; HTN = hypertension; IUGR = intrauterine growth restriction; LBW = low birth weight; PROM = premature rupture of the membranes; PPE = personal protective equipment.

for 64% of medical students at the Sultan Qaboos University in 2015, 61.5% of resident doctors employed by the Ministry of Health and 42% of all doctors.¹⁰¹ Various ergonomic deficiencies were also identified in a survey of typical offices in Oman including issues

related to workstation design, furniture and working hours; in addition, the survey participants reported major health problems including eyestrain (58%), shoulder pain (45%), back pain (43%), arm pain (35%) and neck pain (30%).¹⁰²

Accordingly, a health and safety management system should be implemented to help identify, prevent, treat and mitigate ergonomic-related hazards posing a threat to pregnant healthcare workers in Oman. Ideally, this system should proactively assess and correct identified hazards before workers are injured or become ill.¹⁰³ This can be achieved through a comprehensive programme to promote the safe lifting, handling and transfer of patients. Such a programme would require focused management leadership, participation from employees, early hazard appraisal, anticipation and control, education and training and routine evaluation and improvement activities.¹⁰⁵ Ergonomic measures without sufficient management support have shown to have limited success in reducing work related health problems in healthcare workers.¹⁰⁶

Currently, there is a dearth of research concerning ergonomic stressors and its impact on pregnant workers in the GCC region, particularly for those in healthcare occupations. Statistical data are necessary to determine the impact of ergonomic stressors on work-related injuries, absenteeism and job turnover in order to assess and mitigate these issues. As such, a well-planned evidence-based ergonomic analysis of pregnant healthcare employees in Oman is recommended to determine how ergonomic principles impact the occupational safety and productivity of this population group.

Conclusion

This review sought to assess the impact of various ergonomic stressors on pregnancy outcomes among healthcare workers. Reducing work-related risks for pregnant workers can increase employee productivity and safety in healthcare units, whereas poor work-related ergonomics can have serious maternal and fetal consequences including spontaneous abortions, preterm delivery, low birth weight babies and infertility. In order for policymakers to address these concerns, a national research-based ergonomic analysis must be performed to assess the effects of ergonomic stressors on the health and safety of pregnant workers in Oman, specifically those employed in healthcare settings.

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