ORIGINAL ARTICLE

The influence of prepartum physical activity patterns on mode of delivery in postpartum women

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ABSTRACT

Background: Pregnancy related complications like gestational diabetes, hypertension and gestational weight gain can be prevented by physical activity as suggested by WHO, however, little has been explored about this in Pakistan. This study was designed to explore whether low levels of physical activity before pregnancy are associated with an increased likelihood of cesarean delivery.

Material & Methods: This study was a cross-sectional study conducted on female patients admitted at Gynecology& Obstetrics department of Lady Reading Hospital, Peshawar. A total of n=132 postpartum healthy women (mean age= 25±5.307 years) were included in the study through convenience sampling technique. Physical Activity among the participants was assessed using International Physical Activity Questionnaire (IPAQ-short form) and by calculating Metabolic Equivalents of Tasks (MET-minutes/week).

Results: The results of this study showed that level of prepartum physical activity was reduced in around quarter (24.2%) in postpartum women. A total of 75.7% reported the minimum level of activity required for performing daily activities. None of the participants reported high levels of physical activity (0%). A statistically significant association (p=0.001) was found between the mode of delivery namely, normal vaginal delivery and cesarean section and the level of physical activity among participants.

Conclusion: The study indicates a significant association between the type of delivery and the level of physical activity among females of childbearing age. Women who underwent normal vaginal delivery were engaged in moderate physical activity whereas those with pre-term or cesarean deliveries predominantly reported low physical activity levels.

Key Words: Cesarean Section, Mode of Delivery, Physical Activity, Postpartum

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INTRODUCTION

Cesarean delivery is among the most commonly performed surgical procedures by gynecologists and obstetricians. [1] An overwhelming prevalence of C-section has been recorded as high as 45.2% worldwide. The rate is higher in private hospitals as compared to public hospitals. [2] This has become an important health issue. The health care system has generated guidelines and clinical recommendations to increase the likelihood of normal vaginal deliveries back to practice. [3] Normal vaginal delivery is a natural childbirth process. It is beneficial for both mother and the newborn [4] Childbirth occurring after 27 gestational weeks or before 37 gestational weeks is defined as pre-term. [5] This type of delivery is associated with higher risk of neonatal morbidity and mortality. [6] In Pakistan, top the major risk factors were identified for pre-term delivery. These included Placenta Previa, maternal thyroid disease and asthma and fetal distress. [7] Pakistan is one of the ten countries that collectively account for approximately 59% of the global maternal mortality burden. [8] This significant share underscores the persistent challenges faced by the country's maternal healthcare system, including limited access to quality prenatal and postnatal care, insufficient skilled birth attendance, inadequate emergency obstetric services, and sociocultural barriers that hinder women's access to timely medical intervention.[9] There is a scarcity of research specifically examining the association between physical inactivity and the mode of delivery, particularly in relation to non-

elective cesarean sections.[10,11] However, the limited existing literature suggests that a lack of physical activity prior to pregnancy may be an independent risk factor for adverse delivery outcomes, such as perineal lacerations. This association is thought to be linked to factors including reduced pushing force, weakened pelvic floor muscles, and prolonged second stage of labor all of which may compromise the efficiency of vaginal delivery and increase the likelihood of surgical intervention. [12] Physical activity before and during pregnancy has been linked to various maternal health benefits, including improved muscular strength, enhanced pelvic floor function, and more efficient labor progression. [13,14] However, there is a noticeable gap in research exploring the direct relationship between physical inactivity and delivery outcomes, particularly in relation to non-elective cesarean sections and complications such as prolonged labor or perineal trauma. Given the limited studies available on this topic this study was designed to explore whether low levels of physical activity before pregnancy are associated with an increased likelihood of cesarean delivery. Understanding this association could contribute to preventive strategies in maternal health care and promote physical activity as part of preconception counseling and antenatal care.

METHODS

This study was a cross-sectional study conducted on female patients admitted at Gynecology & Obstetrics department of Lady Reading Hospital, Peshawar. Permission was obtained from Review Board of Khyber Medical University and Ethical Committee of Lady Reading Hospital. Raosoft online sample size calculator was used for sample size calculation. A total of 132 postpartum women (mean age= 25±5.307 years) were included in the study through convenience sampling technique. Based on literature: Females with (1) age 18 & above, (2) singleton pregnancy, (3) Cognitively stable and females who can communicate were included in the study. Patients were excluded from the study if they had history or present complaints of following conditions; Hypertension, Diabetes Mellitus Type-I, Gestational diabetes mellitus and Premature rupture of the membranes, Antepartum Hemorrhage Cervical Insufficiency, Placenta Previa, Umbilical Cord prolapsed and Chorio-amnionitis. After confirming eligibility, written informed consent was obtained and confidentiality was maintained.

Patients age and postpartum time period was recorded. For assessment of Physical activity two outcome measure were used; International Physical Activity Questionnaire (IPAQ-short form) and MET of Task (Walking MET-minutes per week).

The International Physical Activity Questionnaire (IPAQ) is a standardized tool designed to capture comprehensive information on physical activity undertaken by individuals across different domains of daily life. It considers four major areas: leisure-time activities (such as exercise, sports, and recreational walking), domestic and gardening activities (including household chores, cleaning, and yard work), work-related activities (such as walking or standing at work, manual tasks, or physically demanding occupations), and transport-related activities (such as walking or cycling for commuting or daily errands).[15] On the basis of scores obtained from all the participants on IPAQ-short form, participants were divided into low physical activity group = inactive, moderate physical activity group= minimally active and high physical activity group= health enhancing physical activity. To measure the energy expenditure per week Metabolic equivalents for walking were calculated. Participants were then classified into low METs (<500), Recommended METs (500 to 1000) and High METs (>1001) groups.

Data was analyzed using SPSS version 26. Mean and standard deviations were used for patients' age. Frequency tables were used to investigate the patterns of physical activity cross the sample. Chi square and cross tabulations were applied to find association between physical activity and mode of delivery.

RESULTS

A total 132 female postpartum patients were included in the study. The mean age of the participants was 25±5.307 years. The mode of delivery was recorded as preterm (15.20%), normal vaginal delivery (66.70%) and cesarean section (33.30%). In preterm deliveries, n=16 females gave birth normally while n=4 underwent C-section. (Figure-I). Participants were classified into low level, moderate level and high level of physical activity, based on the total scores obtained on IPAQ-short form. Maximum participants met moderate level of physical activity (n=100) while (n=32) were not fulfilling the criteria of minimally required physical activity as recommended international guidelines. None of the participants reported

high level of physical activity (n=0) (Figure-II) The intensity of Physical activity was further quantified by using another measuring tool Walking MET; "Metabolic Equivalent of Task" per week. Current guidelines recommend engaging in 500 to 1000 MET-minutes per week of regular physical activity. Among the participants, 50 individuals (37.9%) had walking METs < 500, while 57 females (43.3%) recorded METs between 501 and 1000. Additionally, 25 women (18.9%) reported walking METs greater > 1001 METs-minutes per week (Figure-III). Cross tabulation and Chi square test were applied to find the association between variables. Statistically strong association was observed between NVD, Cesarean section and physical activity levels (p=0.001). No association was determined between Preterm births and physical activity levels (table-I).

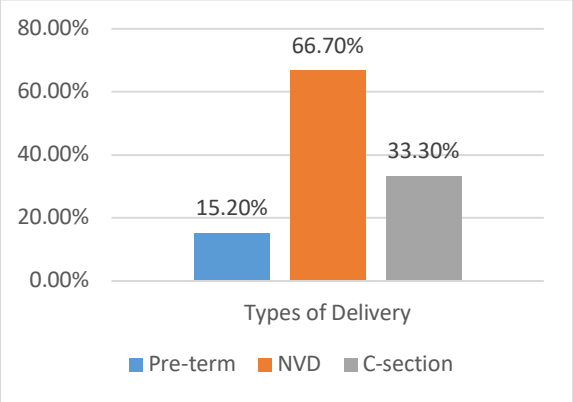

Figure-I: Figure showing types of deliveries

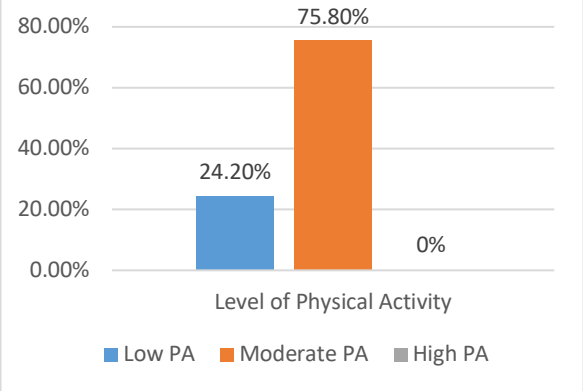

Figure-II: Figure showing level of physical activities

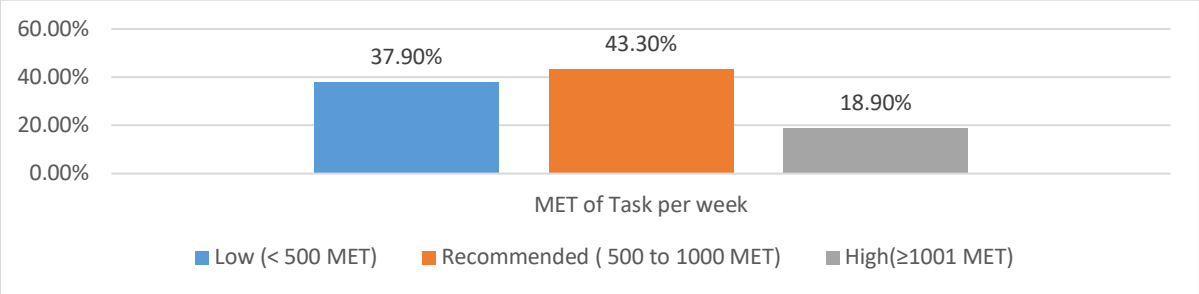

Figure-III: Figure showing weekly METs of the included participants

Table 1: Showing association Level & Intensity of Physical (Activity with mode of delivery

	Physical Activity Levels			
Mode of Delivery	Low Physical Activity	Moderate Physical Activity	High Physical Activity	P value
Pre-term	29	15	0	0.43
NVD	3	85	0	0.001
C-section	4	16	0	0.001
	MET of Task /Walking METs-min per week			
Mode of Delivery	Low (<500 MET)	Recom. (500-1000 MET)	High (≥1001 MET)	
Pre-term	32	9	3	0.63
NVD	18	48	32	0.001
C-section	4	16	0	0.001

DISCUSSION

This study was conducted to demonstrate the association of physical activity during pregnancy on mode of delivery among women with childbearing age. The study highlights a significant association between the type of delivery and the level of physical activity. Women who underwent normal vaginal delivery (NVD) were more likely to engage in moderate physical activity and achieve recommended or high levels of MET-minutes per week, whereas those with pre-term or cesarean (C-section) deliveries predominantly reported low physical activity levels and lower MET scores. While no significant association was observed between pre-term delivery and physical activity, both

NVD and C-section showed strong associations (p = 0.001).

Among pre-term deliveries, the majority (29) reported low physical activity, while 15 reported moderate activity; none had high physical activity (P = 0.43, not significant). In normal vaginal delivery (NVD), most women (85) reported moderate physical activity, with very few (3) reporting low activity. The association was statistically significant (P = 0.001). In C-section deliveries, most reported moderate activity (16), while 4 reported low activities, with no high activity. This association was also significant (P = 0.001). Based on MET of Task: in pre-term deliveries, most participants had low MET (<500), while only a few reached recommended or high levels (P = 0.63, not significant). For NVD, nearly half achieved recommended levels (48), and 32 even reached high MET levels, showing a significant association (P = 0.001). In C-section cases, most (16) were in the recommended category, while a few (4) were low; none were in the high MET group. This association was also significant (P = 0.001).

Rajabi et al conducted a prospective cohort study in Iran, including 2,029 pregnant women who received healthcare between the 18th and 29th weeks of gestation. Of the total participants, 1,334 underwent cesarean sections, while 692 had normal vaginal deliveries. The study found that higher levels of physical activity were more prevalent among women who had normal vaginal deliveries. These findings align with the results of our study, possibly due to the inclusion of a similar age group in both studies[16].

A meta-analysis conducted recently showed that Females (n=3359) in the exercise groups were comparatively at lower risk of having a cesarean section. In the same study it was observed that pregnancy related weight gain was comparatively less in exercise group than control group. Body mass index is positively correlated with risk of cesarean section. [17]

Tinloy et al conducted a study involving 3,006 pregnant women who were provided with weekly exercise routines during their third trimester. The study reported that 5% of participants experienced preterm birth, 29% underwent cesarean section, and 20% required antenatal hospitalization. At least 150 minutes of physical activity per week was found to be associated with a reduced risk of cesarean delivery. However, no association was observed between physical activity and the incidence of preterm birth.[18] The findings of this study are similar to our study as we do not observe significant association between preterm births and physical activity levels.

Owe et al. conducted a large cohort study that included around 39,187 nulliparous women with singleton pregnancies. They examined the relationship between prenatal physical activity and pregnancy outcomes. The results revealed an overall cesarean section rate of 15.4% among the study population. These findings indicated that engagement in prenatal exercise was associated with a reduced likelihood of cesarean delivery. Women who participated in physical activity more frequently, particularly more than five times per week, experienced a substantially lower rate of cesarean sections compared to those who did not engage in any exercise during pregnancy; suggesting that regular prenatal exercise may help in reducing the need for surgical delivery. [19]

A study was conducted in China by Qi et al. to evaluate the effectiveness of prenatal physical activity. The study enrolled a cohort of 519 women with a history of cesarean section. The study identified several factors associated with an increased risk of cesarean section. These included maternal age below 40 years, gestational weight gains of less than 20 kg, reduced physical activity. It was observed that higher level of physical activity during pregnancy is associated with an increased likelihood of normal vaginal delivery. [20]

CONCLUSION

The study indicates a significant association between the type of delivery and the level of physical activity among females of childbearing age. Women who underwent normal vaginal delivery were engaged in moderate physical activity whereas those with pre-term or cesarean deliveries predominantly reported low physical activity levels.

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