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EFFICACY OF NUTRITIONAL COUNSELLING ON GESTATIONAL WEIGHT GAIN IN OVERWEIGHT AND OBESE WOMEN

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ABSTRACT

Objectives: To identify the knowledge gaps of pregnant Indian women with regards to gestational weight gain (GWG) recommendations, pre-pregnancy weight classification, and the efficacy of nutritionists in educating women.

Methods: A cross-sectional study of 398 pregnant women was conducted in the waiting rooms of four tertiary maternity centres in Hyderabad using a validated, self-administered questionnaire. Chi square test was done to determine if nutritional counselling improved knowledge levels.

Results: Majority of overweight (62.6%) and obese (76.3%) women underestimated their weight category ($p<0.001$) whereas underweight women (57.1%) overestimated their weight category ($p<0.001$). 27.1% of women accurately identified the recommended weight gain with obese women more likely to overestimate ($p=0.003$) and underweight women more likely to underestimate the appropriate GWG ($p<0.001$). 39.5% (n=143) of all surveyed women met a nutritionist and/or attended a group antenatal nutrition session after beginning antenatal care in the study centres; although obese women were more likely to seek personalised consultations with a nutritionist. Nutritional counselling of overweight and obese women, both group sessions and personalised consultations significantly improved knowledge of GWG recommendations ($p=0.01$).

INTRODUCTION

Global obesity rates have seen a staggering increase with 52% of adults being classified as overweight or obese in 2016.[1] India, which earlier faced concerns of undernutrition is now seeing an increasing burden of over-nutrition; particularly in urban settings.[2] Overnutrition can have far reaching consequences for the reproductive age group. High pre-pregnancy body mass index BMI and/or excess gestational weight gain (EGWG) are associated with maternal and offspring complications such as gestational diabetes, hypertensive disorders of pregnancy, postpartum weight retention, long-term maternal obesity, operative and instrumental deliveries, macrosomia, preterm birth, stillbirth, neonatal morbidity and adult obesity.[3]

In 2009, in response to rising obesity rates the Institute of Medicine established new guidelines for weight gain in pregnancy based on pre-pregnancy BMI. The American Congress of Obstetricians and Gynecologists (ACOG) now recommends that BMI should be calculated and

weight gain addressed by clinicians at the first prenatal visit.[1] Despite these guidelines, studies on gestational weight gain (GWG) knowledge and perceptions of weight related counselling in western nations have demonstrated low knowledge levels and a disparity between patients' and health care providers' (HCP) views on provision and adequacy of GWG advice.[5-8] Research has shown that pre-pregnancy weight misconceptions,[9-11] and higher GWG targets predispose women to EGWG.[1,9] Little is known regarding the extent of knowledge of pregnant Asian women and the efficacy of nutritional counselling.

The purpose of this study was to examine the knowledge of pregnant Indian women regarding their pre-pregnancy BMI, GWG recommendations, perception of risks of EGWG and to identify the role their nutritionists play. This will facilitate the design and implementation of effective educational programs.

METHODOLOGY

Questionnaire development and validation

A 17-item, multiple choice paper based questionnaire was developed by the investigators to assess pregnant women's knowledge and perceptions of their pre-pregnancy weight, GWG recommendations, consequences of EGWG, perception of adequacy of dietary knowledge, and sources of information for GWG and diet. The self-administered questionnaire was designed to be completed in 10 minutes. Scoring for consequences of EGWG was on a scale of 0-7, with each correct answer receiving one point. Content validation was completed by a panel (n=6) of obstetricians, nutritionists, midwife and statistician. The questionnaire was refined as per feedback from the expert panel and was pilot tested on 40 pregnant women. It was found to have a Cronbach's alpha of 0.7, indicating good internal reliability.

Study Design, Participants, and Recruitment

A purposive study was conducted in the waiting rooms of 4 urban tertiary maternity centres over the span of five months, from August 2017 to December 2017. All English-literate women with singleton pregnancies, registered at the study centre, attending their antenatal check-ups, at any stage of pregnancy were invited to participate. The administrative staff recruited women after they completed their initial anthropometric assessment, prior to meeting the clinician.

Height and weight were recorded from hospital medical records and pre-pregnancy BMI was calculated as the ratio of weight in kilogram to the square of height in metres. Women were categorised as per WHO criteria into underweight (BMI < 18.5 kg/m^2), normal weight (18.5-24.9 kg/m^2), overweight (25-29.9 kg/m^2) and obese ($\geq$30 kg/m^2) categories.[12] Height and weight as recorded in the medical records were measured using a stadiometer (Bio plus No.26 SM) and digital weighing scale (Omron HN-286) respectively. This study was conducted in accordance with the Declaration of Helsinki guidelines and the Indian Council of Medical Research ethical guidelines for biomedical and health research. The protocol was approved by the Hospital Institutional Review Board prior to initiation and all participants gave written informed consent before completing the questionnaire.

Statistical analysis

Chi-square test of proportionality was used to analyse difference between groups for categorical variables. Chi-square test of independence and Fisher's exact test were used to measure the correlation between categorical

variables. Logistic regression was used to assess predictors of knowledge levels. A p-value ≤ 0.05 was considered to be statistically significant. Results are reported as mean ± standard deviation for continuous variables and categorical variables are expressed as percentages. Due to a lack of previous studies in this population, a sample size of 420 was chosen, assuming 50% knowledge and accounting for a 10% non-response rate. Analysis of data was conducted using R-Script (version 3.4.1, 2017, R Development Core Team, Vienna, Austria).

RESULTS

500 women were invited to participate and 457 women agreed to do so. Out of these, 21 women whose pre-pregnancy anthropometric data was unavailable and 38 women who had left more than a page of missing responses were excluded.The final sample size was 398 women. Characteristics of the participants are outlined in table 1.

Knowledge and perceptions of pre-pregnancy weight

58.8% of study participants accurately identified their pre-pregnancy weight category. 34.2% and

Table 1. Demographic and obstetric characteristics of pregnant women participating in a survey on gestational weight gain knowledge (n=398).

Characteristics		
Continuous variables	Mean	SD [a]
Age (years)	28.0	3.85
Categorical variables	n	%
Education		
High school	41	10.3
Graduate	357	89.7
Occupation		
Homemaker	286	71.9
Working	112	28.1
Gravid status		
Primigravid	226	57.1
Multigravid	170	42.3
Stage of pregnancy [b]		
First trimester	31	7.80
Second trimester	104	26.2
Third trimester	260	65.5
Not disclosed	3	0.75
Pre-pregnancy BMI category [c]		
Underweight	21	5.28
Normal weight	187	46.9
Overweight	131	32.9
Obese	59	14.8
Antenatal visit number		
1	36	9.05
>1	362	90.9

Standard deviation- [b] First trimester (0-12 weeks), second trimester (13-27 weeks), third trimester (28-40 weeks)

Body mass index (BMI) calculated as the ratio of weight in kilogram to the square of height in metres. WHO criteria are used for BMI classification as underweight (BMI < 18.5 kg/m^2), normal weight (18.5 24.9 kg/m), overweight (25 29.9 kg/m^2) and obese (≥30 kg/m) categories. [c]

6.53% perceived themselves to belong to a lower and higher weight category respectively. Logistic regression showed that women in the third trimester were more likely to accurately identify their weight category (OR= 2.62, 95% CI: 1.24, 5.79). When chi-square test of proportionality stratified by BMI was performed, accuracy of identification of pre-pregnancy weight category differed significantly between the BMI categories. Majority of normal weight women (88.2%) were able to correctly identify their pre-pregnancy weight category (p<0.001). Majority of overweight (62.6%) and obese (76.3%) women tended to underestimate their weight category (p<0.001) whereas underweight women (57.1%) were more likely to overestimate their weight category (p<0.001).

Knowledge of gestational weight gain recommendations

Majority of women (63.3%) reported having knowledge of GWG recommendations. However, only 44.7% knew that recommendations are based on BMI and a mere 27.1% accurately identified the recommended weight gain. The remaining women underestimated (28.4%), overestimated (16.3%) or were unable to estimate (28.1%) the recommended weight gain. When stratified by BMI category, obese women were more likely to overestimate (p=0.003) and underweight women were more likely to underestimate the appropriate GWG (p<0.001).

Knowledge of risks of overweight and excessive gestational weight gain

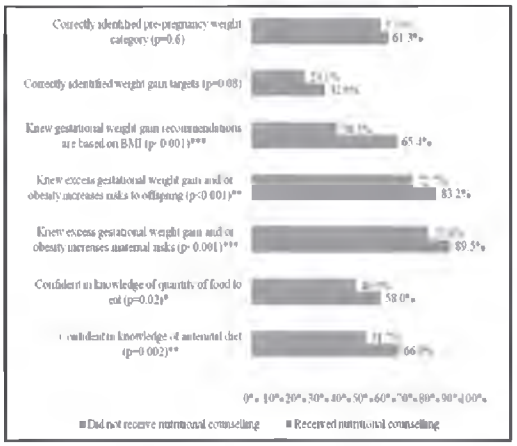
The majority of women acknowledged that being overweight or gaining excess weight during pregnancy increases risks to the mother (83.4%) and baby (76.6%). However, respondents' knowledge of the specific consequences was inadequate. The mean score on a scale of 0-7 was 2.52 (±1.94) and 1.54 (±1.15) for risks to mothers and babies respectively. There was no significant difference in risk perception for maternal (p=0.21) and baby (p=0.29) risks between the different pre-pregnancy weight categories. Women primarily identified gestational diabetes (49.1%), Caesarean delivery (46.9%) and high blood pressure (42.2%) as possible maternal complications. Most women responded that they did not know the specific risks to babies (54.8%).

Role of antenatal nutrition counselling

39.5% (n=143) of all surveyed women met a nutritionist and/or attended a group antenatal nutrition session after beginning antenatal care in the study centres. 79 women sought personal consultations with a nutritionist. It was observed that a significant proportion (p=0.04) of obese women (32.2%, n=19) sought personal counselling sessions with a nutritionist compared to underweight (23.8%, n=5), normal weight (15.5%, n=29) and overweight (19.2%, n=26) women respectively.

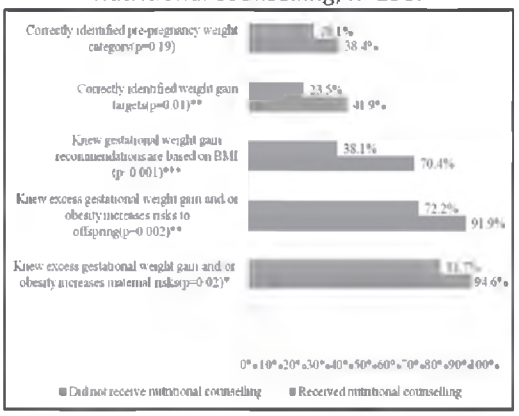
By chi square test of independence, it was observed that women who met a nutritionist or attended a group antenatal nutrition session were significantly more likely to be aware that GWG is BMI dependent and that EGWG can cause complications for mothers and babies. However, there was no significant difference in accurate identification of pre-pregnancy weight category. Women who had attended an ANC class or had a personal consultation with a dietitian were more likely to be confident that they had knowledge of type and quantity of foods to consume during pregnancy (Figure 1). When stratified by BMI, nutritional counselling, either as a group or individual session, was seen to be especially effective in overweight and obese women as these women were also able to identify their recommended target GWG (Figure 2).

Figure 1. Accuracy of knowledge of pregnant women regarding gestational weight gain based on receipt of nutritional counselling, n=398.



*Statistically significant (p≤0.05)
** Statistically significant (p≤0.01)
***Statistically significant (p≤0.001)

Figure 2: Accuracy of knowledge of pregnant overweight and obese women regarding gestational weight gain based on receipt of nutritional counselling, n=190.



*Statistically significant (p≤0.05)
** Statistically significant (p≤0.01)
***Statistically significant (p≤0.001)

DISCUSSION

The study results highlight the frequent misclassification of pre-pregnancy weight category by women with high or low BMI. Consistent with views of pregnant women in Canada, Australia and New Zealand, high BMI women in this study were also inclined to under-assessing and low BMI women tended to over-assess their weight categories.[7, 14] This is concerning as women who are not aware of their pre-pregnancy BMI may not correctly identify their personal GWG targets.[1] The odds of EGWG in overweight-obese women are more than double in under-assessors in comparison to accurate assessors.[4]

Less than half (44.7%) the surveyed women knew that weight gain targets differ based on BMI and less than a third (27.1%) were able to accurately identify their personal weight gain targets. Obese women overestimated whereas underweight women underestimated the recommended weight gain. This is in concordance with recent findings in American and European populations wherein women with high and low pre-pregnancy BMI were more likely to have inappropriate GWG targets.[6,17] Since pregnant women's views of expected weight gain are predictive of actual GWG, women with steeper weight gain targets have a higher likelihood of surpassing the recommendations.[10,12]

Women in this study acknowledged that EGWG increases risks to mothers and infants but knowledge of specific weight-related pregnancy complications was unsatisfactory. This is consistent with findings in USA and Australia.[2, 18] Risk perception scores were not influenced by pre-pregnancy BMI, suggesting that at-risk women are no more knowledgeable than healthy weight women. Consistent with findings in other populations, women were more likely to perceive overweight and EGWG as a risk to the mother rather than the child.[28] Heightening of

risk perception leads to behavioural modifications and pregnant women prioritise health and well being of the baby.[19] Hence educating them about consequences of EGWG to the baby is likely to improve compliance to appropriate weight gain as well as induce healthy dietary and lifestyle changes.

As per hospital protocol, clinicians observe ACOG guidelines for GWG counselling but knowledge levels in this population were still poor. Both patient and clinician related factors might play a role in explaining this. Patient recall may be one reason as research shows that retention of medical information is often poor. Several studies have found discrepancies between health care providers (HCP) and patient perceptions of GWG counselling. Although HCP report counselling patients, a large percentage of women report not receiving advice. This could be because clinicians do not prioritise GWG, spend insufficient time on counselling regarding GWG, face time constraints, or are uncomfortable broaching the topic of weight. [1] Clinicians also tend to either give no advice or non-specific dietary advice, possibly due to lack of time and/or a nutrition background. Studies show that clinicians do prefer to involve nutritionists or dietitians in weight and lifestyle management of high-risk pregnancies.

All pregnant women at risk (BMI >30 kg/m) at the study centres are advised by the clinicians to meet a nutritionist, but as seen in this study, level of compliance was less than expected. These results indicate that most Indian women do not seek advice from nutritionists and/or do not rely on weight gain advice received from nutritionists. The low compliance with seeking nutritional counselling could be a consequence of a poor understanding of the importance of the service or due to difficulty in engaging the services of one in a timely manner.[21] This is in line with findings by Willcox *et al.* who found that only 10% of women sought advice regarding GWG from a dietitian. The majority relied on the Internet, with only 4% relying on a dietitian as their primary source of information.[24] Ledoux *et al.* also demonstrated that few women relied on dietitians for advice about health during pregnancy.[15] This is worrying as content quality on commercial nutrition related websites is often imprecise.[2]

Nutritional counselling either as a group session or a personal consultation had a significant impact on knowledge of personal weight gain targets, risk perception of EGWG and confidence in self-knowledge of appropriate antenatal diet in this population. Nutritional counselling had a greater impact in the overweight and obese population, especially if the sessions were personalised. This aligns with past research which has shown that nutritional interventions are successful in limiting excess gestational weight gain.[3] Women who attend antenatal dietary services have reported positive experiences and that interacting with a nutrition professional improved their understanding of healthy eating.[23] Nutrition professionals are better equipped to provide personalised weight gain targets and monitor weight gain trajectory, as they do not face the same time constraints as clinicians. They can provide a specific and tailored approach. Considering the obvious advantages of nutritional counselling in the antenatal period, incorporating nutritional counselling into routine antenatal care will benefit both patients and clinicians. Strong endorsement of importance of nutritionists by clinicians and mandatory antenatal nutritional visits may help in this regard.

Key strengths of this study are the large sample size, use of a validated questionnaire and to the

best of our knowledge it is the first study to assess the level of knowledge of GWG and the role of nutritional counselling in Indian women. The study did have its limitations. These results cannot be generalised to rural areas, lower socioeconomic groups and women utilising primary care centres as this study was conducted in an urban tertiary centre in women from a higher socioeconomic stratum. However, EGWG is less of a concern in that froup as those women tend to be underweight and are usually at risk of inadequate weight gain.

Future studies should evaluate if women's knowledge and nutritional advice play a role in actual gestational weight gain both in Asian and other populations. The reason for non-engagement of nutritional services needs to be discerned. Identifying cultural beliefs and societal expectations would be beneficial as these may play a role in how women perceive weight gain in pregnancy. The role non-HCP sources such as family and the internet play in knowledge levels needs to be assessed.

CONCLUSION

Women had inadequate knowledge about gestational weight gain. Nutritional counselling is an effective strategy in improving knowledge levels, particularly in overweight and obese women. There is an urgent need for improving patient education, with a focus on at-risk women. It is critical that nutritional counselling is incorporated into routine antenatal care and nutritionists should address both diet and weight in one-on-one sessions throughout the antenatal period.

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Abstract : GWG related knowledge is poor in pregnant Indian women, particularly in the high-risk BMI groups. Nutritional counselling is an effective tool to improve knowledge levels in overweight and obese women.

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