Oral Glucose Tolerance Test for Universal screening for Gestational Diabetes Mellitus

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ABSTRACT

Background: Gestational Diabetes Mellitus increased almost 30% in many countries, including underdeveloped countries and same in Nepal. Hospital-based studies in Nepal reported Gestational Diabetes Mellitus cases, with prevalence 2.48% in 2010 to 4.47% in 2019 emphasising on necessity of universal screening for Gestational Diabetes Mellitus.

Methods: As part of implementation of Electronic Decision support System for Antenatal Care, in formative study clinical vignettes on Gestational Diabetes Mellitus case presented to six healthcare providers (Incharges, Auxiliary Nurse, Midwives and Lab Assistants) from 3 primary healthcare facilities in Kavre and Dolakha districts, Nepal from October-December 2019. 19 Auxiliary Nurse, Midwives from 19 HCF of 4 districts (Kavre, Dolakha, Sindhuli, and Sindhupalchok, including where clinical vignette were applied trained to perform Oral Glucose Tolerance Test for 4 hours. In-depth Interviews conducted with 16 Auxiliary Nurse, Midwives (8 trained & 8 peer coached from selected 4 HCF to explore their perception & experiences of conducting Oral Glucose Tolerance Test and continuing it for future. Clinical vigenttes compared with PEN protocol and IDIs analyzed thematically.

Results: Only 4/6 HCPs made probable diagnosis of Gestational Diabetes Mellitus. 217 Oral Glucose Tolerance Test performed, 24 found to have Gestational Diabetes Mellitus. In-depth Interviews showed Auxiliary Nurse, Midwives enthusiasts on implementing tests for Gestational Diabetes Mellitus and to continue what has been learnt in training. Some challenges; clients hesitate to stay 2 hours at facilities due to unavailability of transport and household work. Oral Glucose Tolerance Test trained Auxiliary Nurse, Midwives seem more confident in counselling and conducting Oral Glucose Tolerance Test than those peer coached.

Conclusions: Administering Oral Glucose Tolerance Test seemed feasible in HCF settings despite some challenges. Training and continuing logistics supply from municipality level seems promising.

Keywords: GDM: Nepal: OGTT:

INTRODUCTION

GDM affecting one out of every six pregnancies globally is leading cause of maternal-fetal morbidity and mortality worldwide.[1-4] Hyperglycemia is found highest in South-East Asia with Asians developing GDM at a lower Body Mass Index (BMI) affecting one in four pregnancies.[5] Diabetes in pregnancy may be a significant contributor to rising epidemic of T2DM has directed our attention towards pregnant women as a primary diabetes prevention strategies .[6] GDM raised by almost 30% in many countries, including underdeveloped countries, is increasing worldwide and same in Nepal.[7-11] Hospital-based studies in Nepal reported increasing GDM cases, with prevalence 2.48% in 2010 to 4.47% in 2019 emphasising on necessity of universal screening of GDM which is now being performed at lab of tertiary

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care centres only in Nepal[12-14] .There is 10 fold higher risk of developing Type 2 Diabetes Mellitus (T2DM) among women with history of GDM than those with normoglycemic pregnancy highlights importance to build capacity of healthcare providers (HCPs) in resource-limited settings who deal with pregnancy.[15-16] Hence, we aimed to elicit feasibility to diagnosis GDM at resource limited setting.

METHODS

This is a part of formative and implementation study for EDSS under mobile health integrated rural ANC (mIRA study). As means of facilitating adoption of ANC guidelines by World Health Organization (WHO), two tablet-based applications developed to serve as clinical decision-making tool for improving ANC services in rural Nepal. It aimed to extend scope of ANC to screen, diagnose, treat and prompt referral of non-communicable diseases such as Pregnancy induced Hypertension (PIH), Gestational Diabetes Mellitus and Anaemia. Target users of these applications were ANMs and Staff nurses and recipients were pregnant women visiting HCFs.

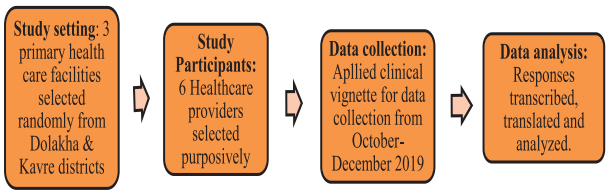
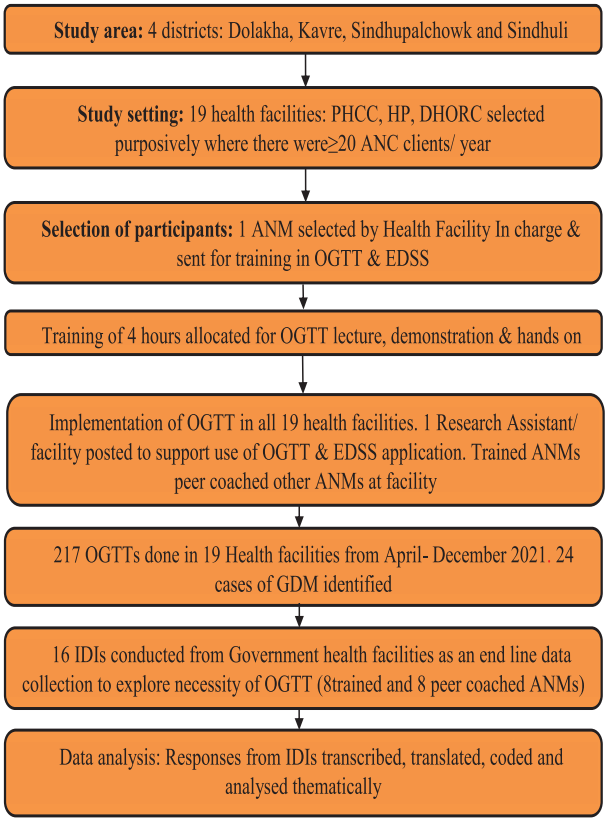


Figure 1. Overview of clinical vignette.

To assess knowledge on GDM diagnosis, clinical vignette applied at primary HCFs i.e Dhulikhel Hospital Outreach Center (DHORC), Primary Health Care Center (PHCC) and Health Post (HP) of Kavre and Dolakha districts of Nepal. We purposively selected six HCPs (facility in-charge, ANMs and lab assistants) from 3 primary HCFs. Clinical vignette presented to HCPs through face-to-face meeting. Participants were in-charges of PHCC (MBBS), in-charge of HP/health centre (Health Assistant-HA), Lab Assistant and ANMs of PHCC/HP/outreach centers. Participants informed about the purpose of study in detail and informed written consent taken to collect data between October and December 2019. Clinical vignette responses audio-recorded and transcribed in Nepali, translated into English, reviewed and verified by senior researcher. Analysis for vignette was done comparing responses with Package of Essential Non-communicable Diseases (PEN) protocol Nepal where mentioned about symptoms of Diabetes & test for GDM.[17,]

OGTT implementation



Training & logistics provided to19 ANMs on conducting OGTT within a part of EDSS implementation. Training of 4 hours allocated for ANMs using lecture & demonstration methods by consultant of Biochemistry along with hands on to use glucometer. Trained ANMs provided peer coaching to other ANMs in their respective facilities & performed OGTT from mid -April to mid-December. Besides, trained fieldworkers provided on-site support for OGTT and EDSS implementation in all 19 health facilities for a month.

Due to logistics & transportation challenge IDIs conducted as an endline in only 4 representative government HCF which includes PHCC & HPs to explore ANM's perception of conducting OGTT and continuing it for future. IDIs were transcribed, translated, coded and analyzed thematically.

Approval was taken from Institutional Review Committee of Kathmandu University School of Medical Sciences (*approval number 159/18*) and Nepal Health Research Council (*reference number 38*) for application of clinical vignette and 2695 for the conduction of IDI as an endline data collection.

RESULTS

Clinical Vignette

Laxmi is 26 years old and is five months pregnant. She comes to the hospital with complaints of unusual thirst and frequent urination. She also complained of fatigue, nausea and frequent vaginal and skin infections (for which she has been taking medicine from the local medical shop). Laxmi has never sought ANC before and this is her first visit to a health facility. She is accompanied by a female community health volunteer (FCHV) to your facility.

What examination will you conduct to assess Laxmi's condition?

What investigations would you recommend for establishing a diagnosis?

What do you think is the probable diagnosis?

How would you manage the case?

What advice would you give to Laxmi and the FCHV?

Participant's responses to clinical vignette for GDM case scenario

Investigation, Diagnosis and referralComparison of clinical vignette with PEN protocol

Nepal's Reproductive Health Clincal Protocol for Staff Nurses & ANMs advocates on

screening and diagnosis of GDM which wasn't in previous protocol.[18]Package of Essential Non Communicable Diseases Intervention at Primary Health Service setting have detailed out sym

Table 1. Demographic characteristics & results from clinical vignette.

Participant	Sex	Health facility	Education	GDM Diagnosed
Int 1	Female	PHCC	MBBS	Yes
Int 2	Female	PHCC	ANM	No
Int 3	Male	DHORC	HA	Yes
Int 4	Female	DHORC	ANM	Yes
Int 5	Female	Health Post	HA	No
Int 6	Female	Health Post	ANM	Yes

Of the six HCPs, 4 correctly identified GDM. Those who identified all suggested the case has to be referred to confirm diagnosis due to absence of logistics.

"She complained of fatigue and thirst so, according to symptoms, we suspect whether she could have gestational diabetes for which we have to refer her to another facility with lab" Int6

"We have no test available here, so it is not in our hands and if there is any probable diagnosis then it will remain as a query and for that case we will refer them to the higher centre for the further test." Int 2

One facility In-charges was able to mention test (OGTT) to confirm diagnosis but again due to lack of logistics and proper training, test could not be performed at primary healthcare setting.

"We should counsel her to do OGTT and all the required tests and also explain about treatment modalities. If it's not possible from here, then I would suggest ideas for her and recommend her to go to a higher center for a referral where it would be easy for her. So, in this way, for her own convenience, I would counsel her and the FCHV who accompanied her." Int 2

Table 2. Demographic characteristics of participants of IDIs conducted in different health facilities of Kavre and Sindhupalchowk districts.

Type of Healthcare facility	Number of health facility	Total number of ANMs	Number of ANMs Trained	Number of ANMs Peer coached
Health Post	2	7	2	5
PHCC	2	9	2	7

217 OGTT were conducted by ANMs within 3 months after training, where 24 cases of GDM were detected via glucometer.

IDIs with ANMs analysed thematically into following themes:

The trained participants said that they had learned about OGTT procedure after training.

"I have known about OGTT through mIRA app training. I know that OGTT is done but I heard it is done only in Dhulikhel. This is a sugar test. If a sugar test is done during pregnancy then it will appear during that time, I heard it should be done. From that time, I have known that if sugar is diagnosed before 22 weeks or has a history of taking medicine then medicine should be taken and continue consulting with a doctor. When OGTT is done and if sugar is high in pregnant women, I have known that medicine should be started and consequences of GDM to baby can be prevented through exercise and diet planning." - ANM B

Almost all participants perceived that OGTT would benefit pregnant women by establishing an early diagnosis and preventing any future complications.

"If mother has sugar then it might affect both mother and baby as well, if you do that test then we will come to know about it. So we can refer them to the hospital and then the disease can be cured as well. "- ANM K

"Positive aspect is that timely diagnosis can be made and prevents problems in the coming days."- ANM B

However, ANMs could identify few barriers that would cause less compliance regarding OGTT among pregnant women. Challenges were geographical difficulties, need to fast for long hours and need to be on an empty stomach.

"For people who are far away, they have to be on an empty stomach for 12 hours or so... After eating dinner at 10 o'clock, they have to come here at 10 a.m. The distance is so far, geographical difficulties, no buses. Sometimes they come late, so we have to return them if fasting hours are not matched. This is disadvantage." –ANM R

"It is difficult I guess because women have to arrive empty stomach from long distances. That is also for the 24 to 30 wks so when we call them for the test they aren't coming in time. Also they have to stay empty stomach till 10 am and again after taking glucose for 1 hour which makes them hungrier. That is not possible in pregnancy as they need nutrition because of that we cannot maintain a diet for them." – ANM H

Some factors that could motivate pregnant women to come for OGTT were providing supplemental nutrients for better health of both mother and baby.

"What I feel is if there is one hope or some kind of greed, if there is no such greed then work won't be done. For that, not just only this but if it's done nationwide, from a uniform point of view if Sarvottam pitho (powder) is given for pregnant mothers, I hope government does this for all pregnant mothers. And if you come for OGTT then we will give this powder to you, maybe we can do it by saying this?" -ANM J

"Like you said, we convince them saying that it will cost them money if they check in hospital whereas here it is free of cost. As it's for free we call them for test as it's for their own health, also they will need additional records for the baby. As they want baby to be healthy, they will come for a number of check-ups and whatever we say they comply with. So it's not that difficult."- ANM N

IDIs results showed ANMs were enthusiastic to implement tests for GDM and would like to continue what has been learnt in training. However, they were also concerned regarding availability of resources required for OGTT.

"Later, if municipality doesn't provide glucose then it will be difficult for us. As, they have to take glucose for that test." –ANM K

"We are confused about whom we should request, either municipality will provide it, or will they help us for some time? We need these materials like lancets and strips. Maybe glucometer will be damaged, how do we purchase that, who will repair it if glucometer doesn't work in between? It would be easy if a final decision was made." – ANM B

DISCUSSION

Our study applied clinical vignettes to 6 HCPs, of which 4 could identified GDM.19 ANMs from 19 facilities trained on use of OGTT. Then 16 ANMs from 4 facilities where ANMs were trained & peer coached by ANMs & field worker of study were interviewed to explore necessity of OGTT to diagnose GDM.

Only few studies relating to OGTT have been conducted in Nepal in order to determine prevalence and incidence of GDM.As far as we are aware, this is first study to assess feasibility of OGTT as universal screening method for GDM in primary care setting. With urbanisation, GDM prevalence is surging up. Yet, a precise diagnostic criterion for GDM is still subject of debate. Though RH Clinical Protocol for nurses and ANM mentioned about glucose challenge test (GCT) if needed at 24-28 weeks and PEN Protocol details steps to perform OGTT for pregnant women as a diagnostic test to identify GDM, there is no such elaborated management guideline.[18] Advocacy on diagnosis and treatment of GDM has been stressed in various other studies.[16, 19]

Level of knowledge regarding OGTT, screening, diagnosis, and management was very limited among HCPs in primary care settings, reflecting need to train them as training HCPs on OGTT could be an important strategy in screening and diagnosis of GDM as a primary preventive measure. There is a need to reach uniformity in screening and diagnosis of GDM internationally.[20]

India follows doing OGTT as universal screening at 24-28 weeks with 75 gm [21]. .[21] Selective screening has shown poor sensitivity and positive predictive value as it leads to missing of about 1/3 of women with GDM.[22-24] Universal screening is associated with increased identification of women with GDM and found to be favourable for neonates of GDM patients.[20] OGTT has been considered most sensitive screening test for GDM.[25] Recent evidences suggests OGTT to be used for screening and diagnosis.[19,26]

Systematic reviews done to summarise evidence regarding barriers to screening, diagnosing and managing GDM in Africa, explored insufficient clinical logistics, inadequate coordination , limited human resources capacity and funding deficits grossly affect testing and management of GDM which is similar to our findings as absence of logistics and trained human resource to diagnose GDM explained by ANMs working in rural settings.[27]Distance of health facility, geographical location, family responsibilities and physical status of mother during 24-28 weeks causing difficulty in travel were perceived as barriers by ANMs. Studies have also shown that ensuring availability of logistics such as glucose packets, glucometer and glucometer strips, universal health coverage, access to health services, societal pressures are barriers that require advocacy and engagement of multiple stakeholders.[28,29] Early detection and treatment of GDM not only reduces unfavourable maternal outcomes, but also prevents diabetes in both mother and child in future.[30]

Reaching a consensus on approaches for screening, diagnosis, and treatment of care across clinical practices in the nation can aid in overcoming certain challenges observed. It is cardinal to build capacities and capabilities in resource-limited settings. This is the first study of its kind, and it is anticipated that its findings will motivate researchers to explore more on importance of OGTT as universal method to diagnose GDM which enable primary care providers to diagnose and treat GDM more effectively. Selection of healthcare facilities for qualitative data might be inadequate to generalize findings therefore, robust research work needs to identify need of GDM diagnosis through OGTT.

CONCLUSIONS

Responses from clinical vignette suggested that health workers from rural health facilities had limited knowledge regarding GDM requiring interventions to promote diagnosis, treatment and referral at early stage. Training ANMs regarding use of glucometer and OGTT could be a game changer not only in reducing morbidity and mortality caused by GDM but also in providing prevalence. In rural healthcare facilities, OGTT appeared feasible as universal screening test for GDM. Trained ANM seemed more confident in counselling about GDM and conducting OGTT.

Hence, we recommend performing OGTT to every pregnant woman in 24-28 weeks of gestation. There is also need for reporting GDM in Integrated Health Information Management System.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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