Author’s response to reviews

Title: Prevalence of Metabolic syndrome in Saudi Arabia - a cross sectional study

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Author’s response to reviews:

Dear Editor,

Thank you for reviewing our manuscript BEND-D-17-00102R1 entitled “Prevalence of Metabolic syndrome in Saudi Arabia"

The reviewer’s and editorial team comments were valid and were considered carefully and we have made the necessary changes in the manuscript wherever appropriate:

Reviewer 1

1. Abstract:

Background is not clear. Author should clearly write the context and purpose of the study.
We agree with the reviewer and the background of the abstract has been rephrased to be as follow:

"Evaluating metabolic syndrome in a society facing type 2 diabetes epidemic may open a new avenue for understanding this rapidly growing metabolic problem globally. Although Saudi Arabia takes the lead over other countries in its high prevalence of obesity and diabetes, there have been very limited epidemiological studies that have looked into the prevalence of metabolic syndrome, therefore the main aim of the current study is to estimate the prevalence of metabolic syndrome and its risk factors among adult Saudi population in comparison to other countries".

2. Background:

2.1. Introduction: Author should clearly write the context and purpose of the study. Author should write few lines on consequences of MS. Author should be careful about reference citation.

- We agree with reviewer comment concerning the context and purpose of the study in the introduction section and it was rephrased as follow:

"This study is a part of the Saudi Abnormal Glucose Metabolism and Diabetes Impact Study (SAUDI-DM) [15] looking at the prevalence of metabolic syndrome and risk factors in adult Saudi society compared to other societies."

- The reviewer’s suggestion concerning adding few lines about the consequences of metabolic syndrome was considered and the following statement was added at the end of the first paragraph of the introduction:

"Subjects with metabolic syndrome are at increased risk for coronary heart disease (CHD) and the presence of metabolic syndrome alone predicted approximately 25% of all new-onset cardiovascular disease (CVD) [4]. Additionally, metabolic syndrome is associated with an increased risk of death from CHD, CVD, or all causes [5]"

- References were carefully reviewed and reference number 1 was replaced by the following reference


3. Materials and Methods:

3.1. Comment 1: Method section needs more organization and coherence. Reviewer wants to know how you define urban and rural areas in Saudi Arabia.

- The residency areas were classified to urban and rural according to the definition given by the Ministry of Municipal and Rural Affairs as clearly mentioned in the
main Saudi Abnormal Glucose Metabolism and Diabetes Impact Study (SAUDI-DM), reference number 15. Additionally, the methodology used in defining urban and rural areas was added to the methods section.

3.2. Comments 2: Author should clearly describe procedures of anthropometric measurements. In Table 1, author presented the hip and WHR. Reviewer has not found any information about hip and WHR in method section.

- The reviewer's point is valid and the anthropometric and vital signs measurement section was amended to include the needed information as follow:

"Hip circumference was measured at the widest part of the body below waist. Waist-to-hip ratio (WHR) was calculated by dividing waist circumference by hip circumference."

3.3. Comment 3: Few more information should be included in Laboratory section. Example: amount of blood, sample transfer procedure, storage in central laboratory, procedure of LDL measurement in case of high Tg (>400 mg/dl).

- The required information concerning the amount of blood, sample transfer procedure, storage in central laboratory was added in the methodology section as follow:

"All the subjects were asked to report to the nearest primary health care center (PHCC) after more than 10 hours of overnight fast after which 10 cc venous blood sampling was collected using sodium fluoride tube. All the blood samples were sent to the central laboratory at the Strategic Center for Diabetes Research in the capital city of Riyadh using portable refrigerators maintaining temperature between 4 and 8 °C and plasma was stored at -20°C at the central laboratory."

- The procedure for LDL measurement has been explained in the methodology section and we did not confront any high triglycerides values, where the highest value was 245 mg/dl (2.77 mmol/l).

3.4. Comments 4: Authors should clearly define all the components presented in tables and figures.

- All tables and figures we reviewed and all the component were defined.

4. Statistical analysis:

4.1. Comment 1: How do you control the skewed data. e.g Triglyceride

- All data has been cleaned and outliers were excluded. All parameters including triglycerides have shown normal distribution.
5. Results:

5.1. Comment 1: Result section needs more organization and coherence. Most of table are really busy. Author should think about all type of readers.

- We agree with the reviewer's comment about the results section that was reorganized and rephrased as follow:

"The studied cohort of 12,126 subjects represent the normal distribution for Saudi population with 10 years interval and mean age of 35.74±14.99 years, wherein men were significantly older than women and both had similar 10 years interval distribution. More subjects lived in urban areas than rural areas. Although the mean body weight and height were significantly higher among men, women had a significantly higher mean BMI, especially with morbid obesity (BMI ≥30 kg/m²) reported at 36.48%. Men had a significantly higher mean waist circumference, while women had higher mean hip circumference and the mean waist to hip ratio was significantly higher among men. Only 20.06% of the study cohort had high monthly income (>8000 SR) and men more predominantly smokers at 26.4% versus 1.36% for women. This study has shown that men had a significantly higher mean SBP and DBP as well as mean FPG, mean LDL and triglycerides, but not for the mean HDL cholesterol which was significantly higher among women.

The prevalence of metabolic syndrome using IDF criteria was 31.61%, which was 34.41% in men and 29.23% in women. But when using ATP-III criteria, the prevalence of metabolic syndrome was higher at 39.82% being 45.00% for men and 35.41% for women, as shown in table 1.

The prevalence of metabolic syndrome and its components increased with age except for the age group ≥70 years. The most frequently occurring components of metabolic syndrome were low HDL, affecting around 80% of the studied sample. The abdominal obesity was ranging between 25% and 70% while elevated blood glucose affected 25% to 60% according to the age group. Elevated triglycerides and high blood pressure were the least frequently occurring components of metabolic syndrome.

Both genders had an increasing metabolic syndrome prevalence with age, although it was more pronounced with the ATP-III criteria. Men had higher prevalence of metabolic syndrome compared to women in the younger age groups, while women had higher prevalence of metabolic syndrome than men in the age group ≥70 years. Middle aged men and women had almost similar prevalence of metabolic syndrome. Women in different age groups had high prevalence of low HDL and abdominal obesity, while the prevalence of elevated blood pressure, blood glucose and triglycerides were higher among men when compared with women in 10 years interval age groups as shown in Table 2.

Figure 2 shows the frequency of one or more components of metabolic syndrome according to different age and gender distribution. As the number of metabolic syndrome components increase, the relative frequency decreases regardless of age group or gender. The frequency of three or more metabolic syndrome components increases with age in both the genders.
According to different age groups the frequency of three or more risk factors for metabolic syndrome was found to be more among men than women except after the age of 70 where women had more frequency of metabolic syndrome components than men.

- Tables have been designed for a comparative purposes with other studies and the amount of data warranted such busy tables, especially table 2.

5.2. Comment 2: Author can add a table to describe the distribution of MetS among participants according to their demographic characteristics rather giving table 1.

- The aim of table 1 was to present the demographic distribution of the selected sample showing that this sample is matching with general population and giving the percentage of different risk factors for metabolic syndrome in the total sample and both genders.

5.3. Comment 3: Data presentation in table 1 are not inform. Author should write either number (%) or % (number).

- Table 1 was reorganized according to the reviewer's suggestion, where descriptive analysis parameters expressed in mean (± SD) were arranged in the first part of the table. At the same time, all frequency data expressed as number (%) were arranged in the second part of the table.

5.4. Comment 4: Author should add the legend in tables and figure. Reviewer has not find any tittle in figures.

- The figures' legends are in a separate page as per the journal submission guidelines, while each table has its own title and footnote was added to table 1.

5.5. Comment 5: Author should correct the typing errors in table 3.

- This typo error was corrected

6. References:

6.1. Comment 1: Author should follow the journal instructions regarding citation.

- The journal instructions regarding citation were followed.

7. Language:

7.1. Comment 1: Need careful review. Author should check and correct the typing errors especially in tables.
- The whole manuscript was reviewed by our linguistic personnel and typing errors were corrected.

8. Conclusions: The manuscript cannot be recommended for publication as it stands now but it could be an interesting manuscript for publication if they considered the aforementioned comments.

- All comment has been considered and the manuscript has been adjusted and resubmitted.

Thank you for considering our manuscript

Kind Regards