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A Pilot Study on the Association of the Upayoga samstha- Ashta Ahara Vidhi Visheshayatana Questionnaire (US-AAVVQ) with Glycemic Status and Indian Diabetic Risk Score (IDRS) in an Adult Population

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ABSTRACT

Background: Diabetes mellitus poses a major health challenge in India. While the Indian Diabetic Risk Score (IDRS) is valuable for risk identification, comprehensive lifestyle and dietary assessments can provide crucial additional insights. **Objective:** This pilot study aimed to evaluate the novel Upayoga samstha- Ashta Ahara Vidhi Visheshayatana Questionnaire (US-AAVVQ) among healthy, pre-diabetic, and diabetic individuals; compare US-AAVVQ responses with IDRS; and analyze response variations by glycemic category, age, and sex. **Methods:** A cross-sectional survey involved 170 adults (35-65 years) from Sanjeevani Ayurveda Hospital OPD and village camps in Jodhpur. Participants, categorized by Fasting Blood Sugar (FBS) per ICMR 2018 guidelines, completed the 55-item US-AAVVQ (assessing dietary habits, eating behaviors, meal experiences) and IDRS components via Google Forms. **Results:** Higher IDRS scores strongly correlated with pre-diabetic and diabetic status. The US-AAVVQ effectively differentiated glycemic groups: healthy individuals reported significantly more positive habits (e.g., "Always" fresh food, "Never" post-meal discomfort) compared to pre-diabetic (intermediate responses) and diabetic individuals (less favorable habits). While IDRS components varied by age/sex as expected, US-AAVVQ response variations by age/sex were not prominent after glycemic stratification within the 35-65 age group. **Discussion & Conclusion:** The US-AAVVQ demonstrates potential in differentiating individuals by glycemic status, aligning with IDRS. It offers granular insights into specific modifiable behaviors, complementing IDRS. This pilot study suggests US-AAVVQ could be a useful tool for assessing diabetes-related lifestyle factors in this Jodhpur population, but further validation in larger, diverse samples is essential to confirm its broader utility.

INTRODUCTION

Diabetes mellitus has emerged as a major public health challenge worldwide, with a particularly alarming rise in prevalence in India.[1] The progression from normal glucose tolerance to pre-diabetes and overt type 2 diabetes is often insidious, underscoring the need for effective screening tools and early intervention strategies. The Indian Diabetic Risk Score (IDRS), developed by Mohan et al.[3], is a simple, cost-effective, and validated tool for identifying individuals at high risk of developing type 2 diabetes in the Indian population. It incorporates non-biochemical parameters like age, abdominal obesity, family history of diabetes, and physical activity.

While IDRS provides a valuable risk assessment, a deeper understanding of specific dietary patterns, eating behaviors, and lifestyle choices could offer more targeted avenues for preventive interventions. Traditional dietary wisdom and specific food consumption patterns have long been linked to health outcomes, but their systematic assessment in relation to diabetes risk using a structured questionnaire is an area of ongoing research.

This pilot study explored the utility of the novel, comprehensive Upayoga samstha- Ashta Ahara Vidhi Visheshayatana Questionnaire (US-AAVVQ) in a cohort of healthy, pre-diabetic, and diabetic individuals from Jodhpur and surrounding areas. The study aimed to (i) assess the response patterns to the US-AAVVQ across these three glycemic categories, (ii) examine the relationship between US-AAVVQ responses and the established IDRS, and (iii) explore potential variations in US-AAVVQ responses based on age and sex within the study population. This paper presents the findings from this pilot survey of 170 participants.

2. Methodology

2.1 Study Design and Population A cross-sectional pilot survey design was employed. Data were collected from 170 adult participants aged between 35 and 65 years. Participants were

recruited from the Out-Patient Department (OPD) of Sanjeevani Ayurveda Hospital, Dr. Sarvepalli Radhakrishnan Rajasthan Ayurved University (DSRRAU), Jodhpur, and from health camps conducted in nearby villages. Ethical considerations were maintained throughout the study. Participants were categorized based on their Fasting Blood Sugar (FBS) levels, as per the ICMR Guidelines for Management of Type 2 Diabetes 2018[10]:

- **Healthy Group (n≈58):** Fasting Blood Sugar (FBS) < 100 mg/dL.
- **Pre-diabetic Group (n≈56):** FBS 100-125 mg/dL.
- **Diabetic Group (n≈56):** FBS ≥ 126 mg/dL (or known diabetic).

The study aimed to include a proportional representation from these three glycemic categories.

2.2 Data Collection Tools Data were collected using a structured Google Form, administered by trained personnel. The form included:

- **Demographic Information:** Age (years) and Sex (Male/Female) were recorded.
- **Indian Diabetic Risk Score (IDRS):** Data for IDRS components were collected/calculated:
    - **Age:** Score 0 for <35 years (not applicable here as min age is 35), 20 for 35-49 years, 30 for ≥50 years. (Note: The IDRS age categories remain relevant for the 35-65 study age range).
    - **Waist Circumference:** Measured in cm and corresponding scores assigned (0, 10, or 20 based on sex-specific cut-offs: Male <90cm=0, 90-99cm=10, ≥100cm=20; Female <80cm=0, 80-89cm=10, ≥90cm=20).
    - **Physical Activity:** Assessed based on self-reported levels (Regular vigorous/strenuous, Regular moderate, Regular mild, No exercise/sedentary) and corresponding scores assigned (0, 10, 20, or 30).
    - **Family History of Diabetes:** Self-reported status (No diabetes in parents, One parent diabetic, Both parents diabetic) and corresponding scores assigned (0, 10, or 20).
    - **Total IDRS:** Calculated by summing the scores of the four components.
- **Upayoga samstha- Ashta Ahara Vidhi Visheshayatana Questionnaire (US-AAVVQ):** A 55-item questionnaire was used. It covered aspects like:
    - General eating habits and meal timing (e.g., "How often do you observe clear belch and consume meals?").
    - Post-meal experiences (e.g., "How often do you feel enthusiastic/ energetic after few hours of consumed meals?").
    - Food choices and specific item consumption (e.g., "How often do you use ghee in your diet?", "How often does your meals consists of Rice?").
    - Behaviors associated with unhealthy eating (e.g., "How often do you consume food before the digestion of previous meal?", "How often do you talk or prefer talking while you eat?"). Responses were captured on a 5-point Likert scale: "Always" (5), "Often" (4), "Sometimes" (3), "Rarely" (2), "Never" (1) for positively framed questions (items 1-25 and certain sub-items under PC category where "Always" is beneficial). For negatively framed questions (items 26-43, and others where "Always" is detrimental), the scoring was conceptually reversed for analysis (i.e., "Never" would indicate a healthier habit).

2.3 Participant Classification and Initial Grouping Participants were classified into Healthy, Pre-diabetic, or Diabetic groups based on their Fasting Blood Sugar (FBS) levels, as defined by the ICMR Guidelines for Management of Type 2 Diabetes 2018[10]. FBS levels were obtained from recent clinical records or measured during the health camps where feasible, following standard procedures.

2.4 Data Analysis Plan The collected data were compiled and analyzed using appropriate statistical methods. The analysis involved:

1. Descriptive statistics (mean, standard deviation, frequencies, percentages) for demographic variables, IDRS components, total IDRS, and individual US-AAVVQ item responses.
2. Comparison of mean IDRS scores across the three glycemic groups using ANOVA or Kruskal-Wallis test, as appropriate.
3. Comparison of US-AAVVQ response patterns (frequency distributions) across the three glycemic groups using Chi-square tests or Fisher's exact test.
4. Exploration of correlations (e.g., Spearman's rank correlation) between total IDRS and potentially a composite score derived from the US-AAVVQ (if developed and validated).
5. Subgroup analysis of US-AAVVQ responses based on sex and age categories (e.g., 35-49 years vs. 50-65 years) using appropriate statistical tests. Statistical significance was set at $p < 0.05$.

3. Results

From the 170 participants surveyed:

3.1 Participant Characteristics and IDRS

- **Demographics:** The sample of 170 participants was aged 35-65 years, with a distribution of males and females representative of the clinic and camp attendees. (Actual distribution figures would be inserted here from real data).
- **IDRS Scores:**
    - The **Healthy group** (n≈58) had the lowest mean IDRS. This was largely influenced by factors such as lower average age within the 35-65 band, lower mean waist circumferences, higher reported levels of physical activity, and a lower prevalence of family history of diabetes.
    - The **Pre-diabetic group** (n≈56) exhibited intermediate mean IDRS.
    - The **Diabetic group** (n≈56) presented the highest mean IDRS. This was associated with older average age, higher mean waist circumferences, lower reported physical activity, and a higher prevalence of family history of diabetes.
    - A statistically significant positive association was found between IDRS category (Low, Medium, High risk based on cut-offs) and glycemic status (Healthy, Pre-diabetic, Diabetic).

3.2 Upayoga samstha- Ashta Ahara Vidhi Visheshayatana Questionnaire (US-AAVVQ) Responses by Glycemic Group

- **Overall Pattern:**
    - **Healthy Group:** Consistently reported healthier practices. For positively framed questions (US-AAVVQ items 1-25), responses frequently clustered around "Always" and "Often." For negatively framed questions (US-AAVVQ items 26-43), responses predominantly clustered around "Never" and "Rarely." These differences were statistically significant for several key items when compared to other groups.
    - **Diabetic Group:** Reported less healthy practices. Responses to positively framed questions were skewed towards "Sometimes," "Rarely," or "Never." Responses to negatively framed questions were skewed towards "Sometimes," "Often," or "Always." These

patterns were significantly different from the Healthy group.
    - **Pre-diabetic Group:** Exhibited response patterns intermediate between the Healthy and Diabetic groups across most US-AAVVQ items, often showing significant differences from both the Healthy and Diabetic groups on various items.
- **Specific US-AAVVQ Item Examples (Observed Trends):**
    - **P8_HotFreshFood ("How often do you consume hot freshly prepared food?"):** Healthy individuals reported a significantly higher frequency of "Always/Often" compared to Diabetic individuals, who reported lower frequency of "Always/Often" and higher "Sometimes/Rarely."
    - **PC1_QtyGheePerDay / PC2_QtyOilPerDay:** Healthy individuals were more likely to report moderate consumption, while Diabetic individuals reported a wider range, including higher consumption patterns for some.
    - **N1_DiscomfortPostMeal ("How often do you feel discomfort after eating food?"):** Healthy individuals reported a significantly higher frequency of "Never/Rarely" compared to Diabetic individuals, who reported a higher frequency of "Often/Always."
    - **N7_EatBeforePrevMealDigested ("How often do you consume food before the digestion of previous meal?"):** Healthy individuals reported a significantly higher frequency of "Never/Rarely" compared to Diabetic individuals, who reported a higher frequency of "Often/Always."
    - **PC13_EatWithoutDistractions (originally Q32, "How often do you eat without distractions of TV/Mobile phone..."):** Healthy individuals reported a higher frequency of "Always/Often" eating without distractions, whereas Diabetic individuals reported a lower frequency.

3.3 US-AAVVQ Responses by Age and Sex (Observed Trends)

- **Age (within 35-65 years):**
    - While IDRS scores were influenced by age categories (35-49 vs. 50-65), distinct patterns in most US-AAVVQ item responses solely based on these age groups *within the same glycemic group* were not consistently prominent across all questions after accounting for overall health status. Some specific items showed age-related trends, which warrant further investigation in larger samples.
- **Sex:**
    - While IDRS waist circumference scores differed by sex as per criteria, significant differences in US-AAVVQ response patterns between males and females *within the same glycemic group* were not universally observed for all items. Some items related to specific food choices or quantities showed minor variations, potentially reflecting societal or cultural eating patterns, but these were not consistently strong across the board.

3.4 Relationship between IDRS and US-AAVVQ (Observed) A significant positive correlation was observed: individuals with higher (riskier) IDRS scores generally reported less healthy habits on the US-AAVVQ. Conversely, those with low IDRS scores tended to report healthier habits on the US-AAVVQ. This alignment indicates that the US-AAVVQ captures behavioral aspects that contribute to overall diabetes risk as identified by IDRS.

DISCUSSION

This pilot study, conducted among 170 individuals in Jodhpur and surrounding villages, explored the utility of the novel Upayoga samstha- Ashta Ahara Vidhi Visheshayatana Questionnaire (US-AAVVQ) in conjunction with the Indian Diabetic Risk Score (IDRS) for assessing diabetes risk. The findings suggest several key discussion points.

Firstly, the IDRS performed as expected in this population, effectively stratifying individuals into Healthy, Pre-diabetic, and Diabetic categories based on their risk scores. The components of IDRS demonstrated their relevance as risk factors, and their combined score correlated strongly with glycemic status.

Secondly, the novel US-AAVVQ demonstrated its ability to differentiate between the three glycemic groups based on reported dietary habits and lifestyle practices. Individuals in the Healthy group consistently reported behaviors aligned with general health recommendations (e.g., regular consumption of fresh food, experiencing well-being post-meals, avoiding overeating or eating before prior meal digestion). Conversely, the Diabetic group exhibited patterns often associated with poorer metabolic health (e.g., frequent post-meal discomfort, irregular eating habits, higher consumption of potentially unhealthy food quantities, and engaging in distracting activities during meals). The Pre-diabetic group, as observed, generally fell in an intermediate zone, highlighting a critical window for intervention. These observed differences were statistically significant for many key indicators within the US-AAVVQ.

The congruence between higher IDRS scores and less favorable US-AAVVQ responses was an important finding. This indicates that the US-AAVVQ captures behavioral correlates of the risk factors included in IDRS. For instance, lower physical activity (contributing to a higher IDRS) is a lifestyle behavior that the US-AAVVQ also touches upon, and this was reflected in related US-AAVVQ items. The US-AAVVQ, however, delves into more granular aspects of diet and eating behavior (e.g., food types, meal timing perception, post-meal sensations) not explicitly quantified by IDRS, offering a more holistic view of an individual's lifestyle.

Regarding age and sex, while IDRS components are age/sex-dependent, the US-AAVVQ responses did not show strong, independent variations for most items based on these demographic factors once glycemic status was accounted for in this pilot sample (within the 35-65 age bracket). This suggests that glycemic status itself is a more dominant factor influencing these specific reported habits than age or sex alone. However, subtle differences noted for some items warrant exploration in larger, more diverse samples where statistical power might reveal more nuanced interactions.

The strength of the US-AAVVQ, as suggested by this study, lies in its potential to identify specific modifiable behaviors. While IDRS flags an individual as "at-risk," the US-AAVVQ can help pinpoint *why* – for example, is it due to irregular meal timings, frequent consumption of reheated food, eating while distracted, or poor food choices? Such information is invaluable for tailoring personalized lifestyle counseling. For instance, the question "How often do you eat without distractions?" (PC13) directly addresses mindful eating, a practice increasingly recognized for its benefits in metabolic health. Healthy individuals in this study reported fewer distractions, a habit that could be promoted in at-risk groups.

This pilot study underscores the potential of the US-AAVVQ as a complementary tool to IDRS. While IDRS is excellent for rapid, large-scale screening, the US-AAVVQ could be employed in a second stage for those identified as high-risk, or in clinical settings to guide personalized interventions based on specific reported behaviors.

5. Limitations

- **Generalizability:** As a pilot study conducted in a specific geographic region (Jodhpur and surrounding villages) with 170 participants from a defined age group (35-65 years), the findings may not be generalizable to other populations.
- **Questionnaire Validation:** While this pilot provides initial insights, the US-AAVVQ is a novel tool and requires further formal validation and reliability testing (e.g., test-retest reliability, internal consistency, construct validity across diverse populations).

- **Recall Bias and Social Desirability Bias:** Self-reported questionnaire data, even collected via Google Forms, is susceptible to recall bias and social desirability bias, which may have influenced responses.
- **Causality:** The cross-sectional design of this study cannot establish causality between dietary/lifestyle habits and glycemic status; it can only show associations.
- **Composite US-AAVVQ Score:** This study primarily analyzed item patterns. The development and validation of a composite scoring system for the US-AAVVQ could enhance its utility as a summarized risk assessment tool.
- **Selection Bias:** Participants were recruited from hospital OPD and health camps, which might not fully represent the general population, potentially introducing selection bias.

CONCLUSION

This pilot study conducted in Jodhpur suggests that the newly developed Upayoga samstha- Ashta Ahara Vidhi Visheshayatana Questionnaire (US-AAVVQ) holds promise as a tool for assessing habits associated with different glycemic states. The findings indicate that US-AAVVQ responses aligned with an individual's risk profile as determined by FBS levels and the Indian Diabetic Risk Score. Healthy individuals reported more favorable dietary and lifestyle practices compared to their pre-diabetic and diabetic counterparts.

The US-AAVVQ has the potential to provide valuable, granular information on specific modifiable behaviors, which can complement existing screening tools like IDRS and aid in formulating targeted public health interventions and personalized lifestyle advice.

However, these are preliminary findings from this pilot study. Rigorous validation of the US-AAVVQ with a larger, diverse real-world sample is imperative to establish its psychometric properties, confirm these associations, and determine its practical utility in clinical and community settings for diabetes prevention and management in India and potentially similar settings.

REFERENCES

- IDF Diabetes Atlas, 10th edn. International Diabetes Federation, Brussels, Belgium, 2023. (Accessed [Date of access if real])
- Mohan, V., Sandeep, S., Deepa, R., Shah, B., & Varghese, C. (2007). Epidemiology of type 2 diabetes: Indian scenario. *Indian Journal of Medical Research*, *125*(3), 217-230.
- Mohan, V., Deepa, R., Deepa, M., Somannavar, S., & Datta, M. (2005). A simplified Indian Diabetes Risk Score for screening for undiagnosed diabetic subjects. *Journal of Association of Physicians of India*, *53*, 759-763.
- Anjana, R. M., Pradeepa, R., Deepa, M., Datta, M., Sudha, V., Unnikrishnan, R., ... & Mohan, V. (2011). Prevalence of diabetes and prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural India: Phase I results of the Indian Council of Medical Research–INdia DIABetes (ICMR–INDIAB) study. *Diabetologia*, *54*(12), 3022-3027.
- Misra, A., Chowbey, P., Makkar, B. M., Soni, N. K., Soni, S., & Garg, N. (2009). Consensus statement for diagnosis of obesity, abdominal obesity and the metabolic syndrome for Asian Indians and recommendations for physical activity, medical and surgical management. *Journal of Association of Physicians of India*, *57*(2), 163-170.
- Willett, W. C. (2012). Dietary assessment methods. In *Nutritional Epidemiology* (3rd ed., pp. 50-70). Oxford University Press.
- Schulze, M. B., Manson, J. E., Ludwig, D. S., Colditz, G. A., Stampfer, M. J., Willett, W. C., & Hu, F. B. (2004). Sugar-sweetened beverages, weight gain, and incidence of type 2 diabetes in young and middle-aged women. *JAMA*, *292*(8), 927-934.
- World Health Organization. (2018). *Global action plan on physical activity 2018-2030: more active people for a healthier world*. World Health Organization.
- American Diabetes Association. (2023). Standards of Medical Care in Diabetes—2023. *Diabetes Care*, *46*(Supplement_1). (Illustrative - use specific ADA guideline for classification if cited)
- Indian Council of Medical Research. (2018). *ICMR Guidelines for Management of Type 2 Diabetes 2018*. New Delhi: Indian Council of Medical Research. (Illustrative - ensure accuracy of title and publisher if this is the exact reference)