



MOBILE HEALTH SCREENING IN TRIBAL VILLAGES OF ODISHA: DISEASE PREVALENCE, AWARENESS, AND GENETIC RISK ASSESSMENT

Prisha Susanne Sunkavalli	Preventive Oncology, Grace Cancer Foundation, Hyderabad, India.
Abhiram Sai Attili	Neuroscience, Haverford College, Philadelphia, USA.
Arush Vudayaraju	Kamineni Academy of Medical Sciences and Research Center, Hyderabad, India.
Chinnababu Sunkavalli	Clinical Director, Yashoda Hospitals, Hyderabad, India.
Daniel Finney Sankuru	Post graduate Community Medicine, Katuri Medical College and Hospital, Guntur, India
Kiran Sai Sunkara	Rutgers University, 160, frelinhusenrd, Piscataway, NJ, USA.
Raghavendra Rao M V*	Professor of Microbiology and Vice-President of the World Academy of Medical Sciences, Netherlands (Europe). *Corresponding Author

ABSTRACT

Tribal communities in Odisha face significant health challenges, including a high prevalence of communicable, non-communicable, and genetic diseases such as sickle cell anaemia. This study reveals a high burden of diseases, including sickle cell anaemia, among Odisha's tribal populations. The sickle mutation results in the substitution of valine in place of glutamic acid in the 6th position of Beta chain. Sickle cell disease is an autosomal recessive blood disorder that can lead to anemia. It is caused by a mutation in the hemoglobin gene, which leads to deformation of red blood cells. Deformed red blood cells can obstruct small vessels and they are prone to destruction. Sickle cell anemia is an inherited form of anemia - a condition in which there aren't enough healthy red blood cells to carry adequate oxygen throughout your body. People who have sickle cell disease have an abnormal protein in their red blood cells. People with this disorder have atypical hemoglobin molecules called hemoglobin S, which can distort red blood cells into a sickle, or crescent, shape. Many of them burst apart as they move through your blood vessels. The sickle cells usually only last 10 to 20 days, instead of the normal 90 to 120 days. The sickle-shaped cells can also stick to vessel walls, causing a blockage that slows or stops the flow of blood. When this happens, oxygen can't reach nearby tissues. The lack of oxygen can cause attacks of sudden, severe pain, called pain crises. These attacks can occur without warning. Mobile screening and awareness programs are vital for early detection and improving health outcomes.

KEYWORDS : Tribal health, Odisha, sickle cell anemia, communicable diseases, non-communicable diseases, mobile screening

INTRODUCTION

Odisha is home to one of the largest tribal populations in India, characterized by unique socio-cultural practices and significant health disparities (1)

According to the World Health Organization (WHO), health is defined as a state of complete physical, mental, and social well-being, not merely the absence of disease or infirmity. However, the tribal communities of Odisha face multiple health challenges, influenced by a complex interplay of socio-economic, environmental, and cultural factors (2)

Their health status is shaped by poverty, geographical isolation, inadequate healthcare infrastructure, traditional healing practices, poor sanitation, and limited awareness of preventive healthcare measures (3,4)

Tribal populations in Odisha are highly vulnerable to both communicable and non-communicable diseases (NCDs), including tuberculosis, skin infections, anemia, diabetes, hypertension, and sickle cell anemia (5)

Additionally, environmental hazards such as deforestation, mining activities, and displacement further exacerbate their health vulnerabilities (6,7)

Limited access to maternal and child healthcare, inadequate implementation of welfare policies, and a lack of health literacy further contribute to poor health outcomes in these populations.

A disease of genetic character, described for the first time by Herrick in 1910 (8)

Affecting individuals of African origin and originating from a mutation to chromosome 11 (9)

Resulting in the substitution of glutamic acid by valine at position six of the sixth position from the N-terminal of the β -chain of the haemoglobin molecule, giving rise to hemoglobin S. Osteomyelitis (both acute and chronic) is one of the most common infectious complications in people with sickle cell disease. (10)

Major complications of the disease in childhood include acute splenic sequestration crisis, aplastic crisis, acute chest syndrome, stroke, chole-lithiasis, renal disease, infection, and pain. (11)

Odisha is one of the most diverse states for indigenous populations, with 62 tribal groups and 22.8% of its population belonging to scheduled tribes, amounting to over 10 million persons (12)

The public healthcare provisions for tribal populations remain subsumed in common rural healthcare programs. However, due to a unique geographical and socio-cultural milieu, there are substantial gaps in healthcare access and unmet needs in these groups compared to the rest of the population (13,14)

Tribal people in India have worse health indicators than the general population. This is compounded by the lack of connectivity, health literacy, awareness, and unique healthcare-seeking behaviour among these groups (15,16)

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population. This is compounded by the lack of connectivity, health literacy, awareness, and unique healthcare-seeking behaviour among these groups (19,20).

This study aims to assess the prevalence of communicable and non-communicable diseases, with a particular focus on sickle cell anemia, while also raising awareness about preventable health conditions in the tribal communities of Odisha. Using the 'GCF Way' screening approach, a structured health intervention was conducted to detect diseases such as cancer, diabetes, hypertension, bacterial vaginosis, G6PD deficiency, and other health concerns. By systematically analyzing the health status of these populations, this study provides crucial insights into the existing healthcare gaps and highlights the need for targeted interventions to improve health outcomes in tribal regions.

OBJECTIVES

1. To estimate the prevalence of communicable and non-communicable diseases among the tribal population in Odisha.
2. To assess the burden of sickle cell anemia in tribal communities and investigate potential underlying causes contributing to its prevalence.
3. To enhance public awareness regarding major health concerns, including cancer, sickle cell anemia, genetically transmitted diseases, and other preventable conditions.

METHODOLOGY

Grace Cancer Foundation, a non-profit organization based in Hyderabad, Telangana, has partnered with SLS Trust, Badampahar, Odisha, to organize a mobile screening for various NCDs and types of cancer. The screenings are also to spread awareness among the tribal population about the various types of cancer, including communicable diseases like tuberculosis, anemia, hypertension, G6PD deficiency, as well as genetically transmitted diseases. This was done by distributing pamphlets and brochures containing relevant information in the local language. The tribal population was screened for various NCDs and cancer types using the GCF Way. The details of this method are mentioned as follows.

Step 1: Registration.

The patient is registered into the GCF system with the help of volunteers by filling in information that makes his/her overall experience smoother, providing necessary details such as name, age, gender, address, and phone number.

Step 2: Medical History.

The patient is then asked various questions to help the team understand the occurrence of any new health concerns with them. Frequently asked questions include history of smoking (if yes, number of cigars/packets per day), drinking (if yes, consumption rate throughout the day), family history of cancer, other health-related issues such as diabetes (if yes, season of occurrence, ongoing treatment, side effects experienced, etc), hypertension (if yes, description of current treatment, if any; family history of hypertension, management strategies of the patient, etc) ailments that were previously diagnosed and current health concerns (if any)

Step 3: Vitals

The patient then consults the nurse for vitals and blood tests. This is an essential component of the screening process for any patient, regardless of their history (or lack thereof) of diabetes or hypertension. Vitals are measured by a blood glucose test, manual auscultation using a sphygmomanometer, and oxygen saturation measurement using a pulse oximeter.

Step 4: Clinical Examination

The patient then goes to the next station to consult one of the doctors. The doctor does a quick physical examination, checking the patient's eyes, mouth, and lymph nodes and then reading the patient's documents before suggesting any appropriate screening tests or medicines for the patient to take.

Step 5: Screening Tests

Patients who are advised to undergo screening tests for cancer then move to the mobile screening buses that contain high-end cancer screening technology. Each bus is loaded with cancer screening equipment, such as Mammography and X-ray machines, used to screen for breast cancer and lung cancer, respectively. The bus also contains a computed radiography room (CR), updated with the latest technology to provide the best possible resolution of the patient's

report. Patients are assisted in undergoing these screening tests by a professional team of seasoned volunteers who guide them through the process seamlessly and efficiently.

Step 6: Pharmacy

The patient then collects the prescribed medication from the pharmacy counter. The medicines provided are of standard quality and are available at no cost to the patient. The medicines provided include basic painkillers, anti-inflammatory drugs, multivitamins, iron for anemia, antibiotics, calcium for osteoporosis,

Step 7: Doctor's advice

After collecting the screening test results and medication, the patient makes a last visit to the doctor for his/her final opinion and receives advice on further action.

This method was used to screen tribal populations across 8 villages of Odisha: Pahadpur, Talakpohari, Bhandan, Padhia, Uperbeda, Talapati, Pandugundi, and Rairangpur. A total of 1694 individuals were screened, out of which 776 cases were detected to be abnormal. Out of all 8 villages, the village of Uperbeda accounted for about 30% of the cases.

RESULTS

The majority of participants (28%) belonged to the 41–50 years age group. The age distribution among the screened individuals was as follows: 5.94% were in the 21–30 years category, 20.79% in the 31–40 years group, 27.72% in the 41–50 years group, 20.79% in the 51–60 years category, 21.78% in the 61–70 years group, and 2.97% in the 71–80 years category.

Out of the 1,694 individuals who participated in the screening, 776 were diagnosed with some form of abnormality. The highest number of cases were recorded in Uperbeda, where 230 individuals were found to have abnormalities. Talapati had the second-highest participation, with 203 individuals, followed by Padhia, where 107 individuals were screened. Other villages that participated in the screening included Talakpohari (96), Bandhan (85), Pandu Kundi (29), Paharpur (26), and Rairangpur (26).

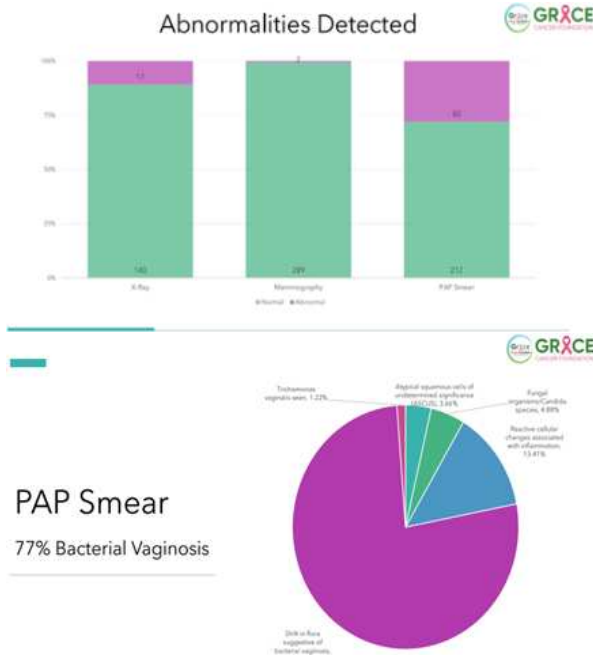
The findings highlight a significant burden of health concerns within these communities, with Uperbeda accounting for nearly 30% of the total detected cases. These results emphasize the need for targeted interventions and continuous health awareness efforts within these regions.



An analysis of the diagnosed non-communicable diseases (NCDs) revealed that anemia (13%) was the most prevalent condition among the tribal population. Other identified NCDs included diabetes mellitus (4.2%), urinary tract infections (UTIs) (2.5%), thyroid disorders (1.5%), lipoma (1.2%), psoriasis (1.6%), renal disease, and asthma (0.8%).

In terms of communicable diseases, the study identified 41 cases of tuberculosis and 62 cases of skin infections, indicating a substantial burden of infectious diseases within the population. These findings highlight the need for targeted healthcare interventions focusing on both NCDs and communicable diseases to improve overall health outcomes in the tribal communities.

Out of 294 individuals who underwent a Pap smear test, 212 cases (72.1%) were normal, while 82 cases (27.9%) were found to be abnormal. Further analysis of these abnormal cases revealed that 77% were diagnosed with bacterial vaginosis, emphasizing the high prevalence of reproductive health concerns among the screened population.



Regarding specialist referrals, 81.19% of patients were advised to consult a gynecologist, 15.84% were recommended to see a pulmonologist, 1.98% were referred to a surgeon, and the remaining 0.99% were advised to consult a cardiologist.

Similarly, an analysis of mammography screenings showed that out of 291 women screened, only two cases were found to be abnormal, indicating a relatively low prevalence of breast abnormalities in the population.

In terms of X-ray screenings, out of 157 individuals examined, 17 cases (10.8%) were identified as abnormal. A detailed assessment of these cases revealed 47% fibrotic changes in the lung, 29.41% patchy radiopacities in the lung, 11.76% prominent hilar markings, 5.88% bifid rib, and 5.88% cardiomegaly. These findings underscore the importance of early detection and referral for appropriate medical interventions within the tribal population.

DISCUSSION

The current study provides valuable insights into the prevalence of communicable and non-communicable diseases among the tribal population in Odisha. A comparison with existing literature offers a broader understanding of public health implications and underscores the need for targeted interventions.

Prevalence of Non-Communicable Diseases (NCDs)

Anemia: In our study, anemia was identified in 13% of the screened population. This is notably lower than the prevalence reported among particularly vulnerable tribal groups (PVTGs) in Odisha, where severe anemia was present in 36.5% of females and 35.8% of males. The discrepancy may stem from differences in study populations, methodologies, and regional variations (21)

Diabetes Mellitus: We observed a 4.2% prevalence of diabetes mellitus in our study population. While specific comparative data for Odisha's tribal communities are limited, other studies have reported a rising trend of diabetes among tribal populations, suggesting the need for increased screening and preventive measures (22)

Prevalence Of Communicable Diseases

Tuberculosis (TB): Our study identified 41 cases of TB, indicating a prevalence of 2.4%. This aligns with a study conducted across six villages in four tribal-dominated districts of Odisha, which reported a pulmonary TB prevalence of 0.68%. Variations in prevalence rates could be due to differences in diagnostic criteria, study design, and regional factors (23)

Skin Infections: We identified 62 cases of skin infections. While specific prevalence rates in Odisha's tribal populations are scarce, studies have highlighted a high burden of dermatological conditions among tribal communities, often linked to inadequate hygiene and

limited access to healthcare (24)

Screening Outcomes For Cancer And Reproductive Health

Pap Smear Tests: Among the 294 individuals who underwent Pap smear tests, 27.9% showed abnormal results, with 77% diagnosed as bacterial vaginosis. This finding underscores the high prevalence of reproductive tract infections among tribal women, often due to poor menstrual hygiene and lack of awareness (25)

Mammography Screening: Of the 291 women screened, abnormalities were detected in only 2 cases (0.69%). This contrasts with broader data indicating that breast cancer constitutes 26% of total malignancies among females in Odisha. The lower detection rate in our study may result from sample size limitations or underreporting due to low awareness (26)

Specialist Referrals And Healthcare Accessibility

Gynecological Consultations: A substantial proportion (81.19%) of referred patients required gynecological consultations, reflecting the high burden of reproductive health concerns. This aligns with studies highlighting gaps in gynecological and maternal healthcare access in tribal regions (27)

Pulmonology Referrals: Approximately 15.84% were referred to pulmonologists, indicating a considerable burden of respiratory illnesses. This finding is consistent with reports of high prevalence rates of respiratory diseases among tribal communities in Odisha (28)

X-ray Findings And Respiratory Health

Abnormalities: Out of 157 individuals undergoing X-ray screening, 10.8% showed abnormalities. Of these, 47% exhibited fibrotic lung changes, and 29.41% had patchy radiopacities. This is comparable to findings from studies reporting a high incidence of chronic respiratory diseases linked to environmental and occupational hazards in Odisha (29)

CONCLUSIONS

Based on the data collected by the staff, we can conclude that although non-communicable diseases are prevalent in this section of society, cancer isn't a cause for major concern. However, it can be inferred that anemia, bacterial vaginosis, hypertension, and diabetes are more prevalent as a result of poor sanitation, lack of hygiene, and lifestyle. The data shows a high prevalence of non-communicable diseases like anemia, diabetes mellitus, and UTI. Raising awareness about these conditions, their symptoms, and the importance of early detection and treatment through health will go a long way in tackling these issues at a micro level. To bridge the gap in healthcare between tribal groups and modern society, mobile screening is an innovative way to not only spread awareness about these issues but is also accessible to these groups. It is an efficient way to bring about positive change in rural areas by reinforcing regular checkups and bringing to light any cause for concern/discomfort among the people.

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