

EFFECTIVENESS OF MODULE BASED TEACHING ON KNOWLEDGE AND PERCEPTION OF CONSANGUINEOUS MARRIAGES AND ITS ASSOCIATION WITH REPRODUCTIVE HEALTH OUTCOMES AMONG PRE-UNIVERSITY STUDENTS IN NORTH KARNATAKA, INDIA

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ABSTRACT:

Primary Objective:

To assess the Knowledge and Perception of consanguineous marriages and its association with Reproductive health outcomes among Pre-University Students

Design: Single group pre-post study.

Setting: Selected Pre university colleges in north Karnataka, India

Participants: P.U II year arts and commerce College students

Methods: Participants completed a 40 items questionnaire with using a 5 point Likert scale to assess their knowledge and perceptions. The questionnaire included items related to consanguineous marriages and their association with Reproductive health outcomes. Descriptive and inferential statistics were used to describe the knowledge and perceptions of students. Measures such as mean, median, mode, standard deviation, percentages were calculated. additionally chi square tests, Pearson's coefficient and fisher's exact tests were applied to assess correlations between variables.

Results: Among 100 participants 89 % (n=89) demonstrated poor level of knowledge, while a smaller proportion 11% (n= 11) had an average level of knowledge with none exhibited good knowledge. Regarding perceptions most participants 95 % (n=95) reported a negative perceptions, whereas only 5% had a neutral perception and none expressed positive perception. Furthermore no statistically significant correlation was observed between student's knowledge levels and their perceptions of consanguineous marriages, nor with their perceived association with Reproductive health outcomes.

Conclusions: These results highlight a substantial gap in awareness and understanding, suggesting the need for targeted educational interventions to improve both knowledge and perceptions among students. Enhancing awareness may contribute to more informed attitudes and potentially better reproductive health decisions in future.

KEYWORDS: Knowledge, perception, students, intervention, awareness, reproductive and health.

INTRODUCTION

Reproductive health is a fundamental component of overall well-being, encompassing physical, mental and social dimensions related to the reproductive system and its function and processes. WHO South-East Asia journal of Public Health: 2019). It is not merely the absence of disease, but also the ability to lead a safe and satisfying reproductive life, supported by informed choices and access to appropriate healthcare services. In many societies, reproductive health is closely linked with cultural practices, including patterns of marriage that influence genetic and familial outcomes. (Rakesh Sharma et al., 2013)

Marriage is a universal institution for Cultural Revolution. It is a legally and socially sanctioned union between one or more wives that accords status to their offspring and is regulated by laws, rules, customs, beliefs and attitudes that prescribe the rights and duties of the partners. There are several types and forms of marriages based on different criterion. They are group marriage, polygamy, polyandry, monogamy, exogamy and endogamy, hypergamy, hypogamy, levirate marriage, sororate marriage and so on. Consanguineous marriage is based on kinship. (Stephanie Foley et al., 2018 and Social Institutions: Forms, Types and Rules of Marriage in India 2016)

The word Consanguineous derived from two Latin words "con" meaning shared and "sanguis" meaning blood. Consanguinity explains a relationship between two people who share an ancestor or share blood.

Consanguineous marriage refers to marriage or a reproductive relationship between two closely related individuals. These types of marriages are favored by different populations usually bound to traditional Customs, beliefs and to keep property in united form within family. 5 In society it is believed that marriages within the relatives are more stable,

have better relationship with in-laws and continuity of cultural practices and also parents believe that in close kin relationship bride will be less important and in laws will be more caring and supportive (Bittle 1994). But according to health care providers and genetics specialists there is an increased genetic risk to the offspring compare to social and economic benefits. (Times of India; Why Arrange marriage are consider d better than the love marriage in the Indian society 2021 and Bittles AH 2002)

There are two types in consanguineous marriages. A "first cousin marriage" refers to a marriage between two people who share the same grandparents; they are the children of siblings (aunts or uncles). This type of marriages can increase the chance of offspring inheriting certain genetic conditions, particularly autosomal recessive disorders due to the shared ancestry and higher likelihood of both parents carrying the same recessive genes. Abnormalities in first cousin marriages occur when both parents carry the same recessive gene, inherited from their common grandparents, which can lead to a higher risk of genetic disorders in their offspring because of the increased chance of the child inheriting two copies of that faulty gene, causing the abnormality to manifest; this is particularly concerning for disorders caused by recessive genes where a single copy of the gene does not result in the disease.

Several scientific studies have shown that consanguineous marriages are associated with an increased risk for congenital malformations and autosomal recessive diseases, with some resultant increased postnatal mortality in the offspring of first cousin couples. Children born to genetically related people from the same family face serious health risks. Consanguineous marriage can result in children with cognitive difficulties, heart defects and impaired hearing as well as other genetically inherited diseases. It can also lead to increased chances of a child inheriting two copies of a defective gene from a shared common ancestor or otherwise recessive genetic disorders.⁷

In second cousin marriage both share great-grandparents, but not the same grandparents. To put it into perspective, while first cousins share grandparents, second cousins connect a generation further back: the great-grandparents. Risk of genetic disorders is slightly higher for children of second cousin marriages compared to unrelated couples; it is still relatively low with a 3-3.5% risk compared to the general population's 2-3%.

Pre-marital and pre-conceptual counseling should offer options for genetic screening to identify potential risks of inherited conditions, helping the couple make informed decisions, Identification of any known genetic disorders or patterns of inheritance within the family, Evaluation of potential risk factors, including if both partners' carrier status for specific genetic conditions, Offering genetic testing to identify carriers of recessive genes, recommending specific tests based on family history and ethnic background, encouraging pre-conception folic acid supplementation, Ensuring optimal nutrition and lifestyle, Discussing lifestyle factors, Inform the Couple about the increased risks of genetic disorders in consanguineous unions, Encourage genetic carrier screening for both partners to assess the risk of inheriting autosomal recessive conditions, acknowledge any fears, anxieties, or misconceptions the couple may have regarding genetic risks and provide support through counseling or referral to mental health professionals, if needed, especially when difficult decisions such as testing or alternative reproductive methods arise. (Santosh Kumar Sharma et al ., 2020)

Education plays a crucial role in preventing consanguineous marriages and mitigating their risks because consanguineous marriages are prevalent in many parts of the world, especially in cultures where cousin marriages are traditionally accepted. Public awareness campaigns are a cornerstone of preventive strategies aimed at mitigating the risks of consanguineous marriages. Government agencies, NGOs and healthcare professionals can collaborate to create national or community-wide health awareness campaigns. These campaigns should focus on the increased risks of genetic disorders, including metabolic diseases, intellectual disabilities, and congenital abnormalities, which are more common in offspring of consanguineous unions. Educational institutions and community centers should organize workshops aimed at high school students, newlyweds, and young couples planning marriage. These workshops can cover basic genetics, inheritance patterns, and real-life stories that explain the potential consequences of consanguinity in a relatable manner. The use of television programs, radio shows, social media and print media (newspapers, pamphlets, and magazines) is an effective way to reach a broader audience. Additionally training in genetic counseling should be included in nursing and medical education to equip healthcare providers with the knowledge needed to handle such cases effectively.

This study is important for Pre-University students as they are at a critical stage for developing awareness about consanguineous marriage and its impact on reproductive health. Understanding these concepts can help them make informed decisions in the future. A module-based teaching approach can systematically improve their knowledge and address misconceptions. This, in turn, promotes healthier attitudes and better reproductive health outcomes.

METHODS:

We used one group pretest post test design approach to explore the knowledge and perceptions of consanguineous marriages and its association with Reproductive health outcomes among Pre-University Students located in north Karnataka, India. Ethical approval was obtained from the KAHER University Belagavi institutional ethics committee prior to before the study was conducted. Simple random sampling was used to recruit participants and detailed information about the study and confidentiality of their response and their consent was obtained. Module based teaching was conducted in different four sessions of interval between one week to provide knowledge.

Participants

A total of 100 second-year Pre-University (PU) students from Arts and Commerce streams were invited to participate in the study. Participants were selected using a lottery method (simple random sampling), and all selected students provided informed consent. Data were collected using a structured questionnaire along with a 5-point Likert scale, both of which were completed by all participants

Measures

Data were collected using a structured questionnaire comprising two sections: (1) demographic characteristics and (2) items assessing participants' knowledge regarding consanguineous marriages and their association with reproductive health outcomes. A 5-point Likert scale was used to measure perception-related responses. The instruments were administered to all participants, and data collection was carried out between August 2025 and January 2026.

Knowledge regarding consanguineous marriages and their association with reproductive health outcomes was assessed using a structured questionnaire comprising 40 multiple-choice items. Each correct response was awarded a score of 1, while incorrect responses received a score of 0, yielding a total possible score ranging from 0 to 40. The total scores were converted into percentages and categorized as follows: <50% indicated poor knowledge, 51–75% indicated average knowledge, and >75% indicated adequate knowledge. Based on these criteria, participants were classified as having poor, average, or adequate levels of knowledge. The internal consistency of the questionnaire was high, with a Cronbach's alpha coefficient of 0.89.

Perceptions of the consanguineous marriages and its association with Reproductive health outcomes

Participants' perceptions were assessed using a 20-item scale based on a 5-point Likert format. For positively worded statements, response options ranged from 5 (strongly agree) to 1 (strongly disagree), while negatively worded items were reverse scored from 1 (strongly agree) to 5 (strongly disagree). The total perception score ranged from 20 to 100. Scores <50 were interpreted as indicating a negative perception, scores between 51 and 75 as neutral perception, and scores >75 as positive perception. The internal consistency of the scale was excellent, with a Cronbach's alpha coefficient of 0.95.

Data analysis:

Data were imported to Microsoft excel 2016 and exported to SPSS software version 20 for analysis. Before conducting the statistical analysis, we performed exploratory data analysis to ensure data consistency and completeness. Descriptive statistics were used to describe the knowledge and perceptions of the students including the mean, standard deviation, frequency and percentage. Chi-square was used to describe the association and the Pearson's correlation coefficient was used to describe whether knowledge and perception were correlated.

RESULTS:

All 100 participants were students enrolled in the second year of Pre-University College (PUC II). Among them, 22% (n = 22) were male and the majority, 78% (n = 78), were female. With regard to age, 52% (n = 52) of the participants were 17 years old, while 48% (n = 48) were 18 years old. The mean age of the participants was 17.5 years.

The total knowledge scores on consanguineous marriages and their association with reproductive health outcomes ranged from 0 to 40. Based on percentage scores, <50% was categorized as poor knowledge, 51–75% as average knowledge, and >75% as good knowledge. The findings revealed that 89% of students had poor knowledge, while 11% demonstrated average knowledge, and none had good knowledge. Further analysis indicated no statistically significant association between pre-test knowledge scores and selected socio-demographic variables, as the p-values were greater than 0.05. Similarly, the distribution of students according to their level of perception showed that, in the pre-test, the vast majority of participants (95%) exhibited poor perception, while only 5% demonstrated an average level, and none had good perception. In contrast, post-test results demonstrated a significant improvement, with the majority of students (87%) attaining a good level of perception and 13% demonstrating an average level; no students remained in the poor category. These findings indicate a marked enhancement in perception levels among students following the intervention. Overall, the findings show no statistically significant association between pre-test knowledge and perception scores with the selected socio-demographic variables among students.

Table No. 01: Association between pre test knowledge scores of subjects with selected socio demographic variables.
N= 100 Adolescents

Sl no.	Demographic variables		Level of knowledge			Fisher's exact test	p value	Inference
			Good	Average	Poor			
1.	Age	17 years	0	6	46	0.858	P >0.05	NS
		18 years	0	5	43			
2.	Gender	Male	0	02	20			

		Female	0	09	69	0.746	P >0.05	NS
		Third gender	0	0	0			
		Non binary gender	0	0	0			
3.	Religion	Hindu	0	6	73	0.092 -	P >0.05	NS
		Muslim	0	4	14			
		Christian	0	1	2			
		Others	0	0	0			
4.	Residency	Rural	0	02	26	0.638	P >0.05	NS
		Urban	0	8	59			
		Tribal	0	1	4			
		Slum urban area	0	0	0			
5.	Type of family	Nuclear family	0	6	54	0.587	P >0.05	NS
		Joint family	0	5	30			
		Extended family	0	0	0			
		Single parent family	0	0	5			
6.	Father Education	Primary school	0	1	19	0.268	P >0.05	NS
		Secondary school	0	9	45			
		Graduation	0	1	21			
		Post graduation	0	0	04			
7.	Mother Education	Primary school	0	5	39	0.895	P >0.05	NS
		Secondary school	0	3	30			
		Graduation	0	3	18			
		Post graduation	0	0	2			
8.	Father Occupation	Private employee	0	7	52	0.581	P <0.05	NS
		Government Employee	0	0	03			
		Daily wage worker	0	4	24			
		Others	0	0	10			
9.	Mother Occupation	Private employee	0	5	18			

		Government Employee	0	0	02	0.235	P >0.05	NS
		Daily wage worker	0	3	22			
		Others	0	3	47			
10.	Marital status	Married	0	1	5	0.647	P >0.05	NS
		Unmarried	0	10	84			
		Widow	0	0	0			
		Divorced	0	0	0			
11.	Type of marriage	Consengeni ous marriage	0	1	5	0.647	P >0.05	NS
		NON-Consengeni ous marriage(Un married)	0	10	84			
12.	Family Monthly income	<10,000	0	3	09	0.417	P >0.05	NS
		10,000-20,000	0	3	35			
		21,000-30,000	0	4	37			
		>30,000	0	1	08			
13.	Source of information	Mass media	0	4	41	0.762	P >0.05	NS
		Health personnel	0	5	28			
		Peer group/social group	0	2	17			
		Any other	0	0	03			

Table No. 02: Mean, Median, Standard Deviation and Range of Knowledge Score of Subjects Regarding consanguineous marriages and their association with Reproductive health outcome.

Area of Analysis	Mean	Median	Standard deviation	Range
Pre-test (x)	13.26	13	4.39	21
Post-test (y)	33.77	33	2.87	12
Difference (y-x)	20.51	20	1.52	09

Table No. 03: Association between pre test Perception scores of subjects with selected socio demographic variables.
N= 20 Adolescents

Sl no.	Demographic variables Adolescent		Level of Perception		
			Good	Average	Poor
1.	Age	17 years	0	0	52
		18 years	0	05	43
2.	Gender	Male	0	4	18
		Female	0	1	77
		Third gender	0	0	0
		Non binary gender	0	0	0
3.	Religion	Hindu	0	5	74
		Muslim	0	0	18

		Christian	0	0	3
		Others	0	0	0
4.	Residency	Rural	0	01	27
		Urban	0	03	64
		Tribal	0	01	4
		Slum urban area	0	0	0
5.	Type of family	Nuclear family	0	0	56
		Joint family	0	04	34
		Extended family	0	01	0
		Single parent family	0	0	5
6.	Father Education	Primary school	0	02	18
		Secondary school	0	02	52
		Graduation	0	01	21
		Post graduation	0	0	4
7.	Mother Education	Primary school	0	01	43
		Secondary school	0	02	31
		Graduation	0	2	19
		Post graduation	0	0	2
8.	Father Occupation	Private employee	0	5	54
		Government Employee	0	0	03
		Daily wage worker	0	0	28
		Others	0	0	10
9.	Mother Occupation	Private employee	0	3	20
		Government Employee	0	0	02
		Daily wage worker	0	0	25
		Others	0	02	48
10.	Marital status	Married	0	1	5
		Unmarried	0	4	90
		Widow	0	0	0
		Divorced	0	0	0
11.	Type of marriage	Consengeni ous marriage	0	0	6
		NON-Consengeni ous marriage(Un married)	0	0	94
12	Family Monthly income	<10,000	0	01	11
		10,000-20,000	0	0	38

		21,000-30,000	0	03	38
		>30,000	0	01	8
13.	Source of information	Mass media	0	03	42
		Health personnel	0	01	32
		Peer group/social group	0	01	18
		Any other	0	0	3

Table No 04: Mean, Median, Standard Deviation and Range of perception Score of Subjects Regarding consanguineous marriages and their association with Reproductive health outcome.
N=100 Adolescents

Area of Analysis Perception adolescents	Mean	Median	Standard deviation	Range
Pre-test (x)	28.89	28.5	6.35	33
Post-test (y)	82.12	82	5.57	30
Difference (y-x)	53.23	53.5	0.78	3

Table no 05: Correlation between knowledge and perception scores

Pre-test			Post-test	
Correlation co-efficient	r=Value	P=Value	r=Value	P=Value
Knowledge	1.000	0.975	1.000	0.079
Perception	0.975	1.000	0.079	1.000

DISCUSSION:

The findings of the present study highlight a significant gap in knowledge among the participants regarding consanguineous marriages and their association with reproductive health outcomes. A large proportion of students (89%) demonstrated poor knowledge, while only 11% exhibited an average level of knowledge; notably, none of the participants had adequate knowledge. This lack of awareness among PUC II students may contribute to uninformed decision-making, potentially increasing the risk of genetic disorders and adverse reproductive health outcomes associated with consanguineous marriages.

The results of the present study are consistent with previous research. A study conducted by Veena V. L et al. (2025) demonstrated that a structured teaching programme was effective in improving knowledge regarding consanguineous marriage among pre-adults. Their baseline findings revealed inadequate knowledge among the majority of participants, similar to the present study, while post-intervention results showed significant improvement, supported by an increase in mean scores and statistically significant test values.

Furthermore, earlier research by Ojha and Jagankumar (2020) emphasized the need for strategic interventions, including Information, Education, and Communication (IEC) and Social and Behavioral Change Communication (SBCC), to raise awareness and sensitize communities about the risks associated with consanguineous marriages. This perspective is supported by Mahboub SM (2019), who reported that changes in attitudes can be achieved through improvements in knowledge, highlighting the importance of targeted educational programmes.

Similarly, Muhammad M. Yakubu (2023) reported that a considerable proportion of students from different countries, including Libya (28.4%), Nigeria (31.7%), Jordan (26.3%), and North Cyprus (13.6%), demonstrated poor knowledge regarding consanguinity, reinforcing the global relevance of the issue. In addition, Abrar S et al. (2019) observed that

improvements in socioeconomic conditions and access to healthcare services may mask the effects of consanguinity, potentially reducing perceived risk without addressing underlying genetic concerns.

Parallel findings from studies conducted by Ritika Rocque (2016) and Devimaya R et al. (2022) indicated that the majority of young adults had inadequate baseline knowledge, and that structured teaching programmes significantly enhanced their understanding of the effects of consanguineous marriage on offspring. Moreover, Palaniammal S (2025) highlighted the complex interplay between knowledge, practices, and socio-cultural factors influencing consanguineous marriages in India. The author emphasized the need for culturally sensitive health education programmes to reduce health risks while respecting traditional practices.

Overall, the findings of the present study, along with existing literature, underscore the urgent need for well-planned educational interventions aimed at improving knowledge and shaping perceptions among students. Such efforts are essential to promote informed decision-making and to mitigate the potential health risks associated with consanguineous marriages.

LIMITATIONS

This study has several limitations that should be considered while interpreting the findings. The study was conducted among pre-university students from selected colleges in North Karnataka, which may limit the generalizability of the findings to other populations with different socio-cultural contexts that can influence both knowledge and perception regarding consanguineous marriage.

The measurement of knowledge and perception relied on a self-administered questionnaire, which may be subject to reporting bias, including social desirability bias. In particular, perception is complex and influenced by cultural beliefs, which may not be fully captured through structured Likert scale responses.

The study assessed immediate changes in knowledge and perception following the intervention, but did not evaluate long-term retention or sustained changes, especially in perception, which may require longer durations to meaningfully shift.

Although improvements in knowledge and perception were observed, the study did not assess whether these changes translated into actual behavioral practices or decision-making, which are important for evaluating real-world impact.

Potential confounding factors, such as prior exposure to information, family background, cultural norms, and media influence, were not fully controlled and may have affected both knowledge and perception outcomes.

Implications for practice

The findings of this study highlight the effectiveness of model-based teaching in improving both knowledge and perception regarding consanguineous marriage and its association with reproductive health outcomes among pre-university students. These results suggest that structured, model-based educational interventions can be incorporated into existing school and pre-university curricula to address sensitive public health topics in a culturally appropriate manner.

Educational institutions should consider integrating reproductive health education modules that specifically address the genetic and health implications of consanguineous marriage, as early adolescence is a critical period for shaping both knowledge and perception. Teachers and health educators can be trained to deliver such interventions using interactive and culturally sensitive teaching models to enhance engagement and understanding.

From a public health perspective, the study supports the need for school-based awareness programs as a preventive strategy in regions where consanguineous marriages are prevalent. Collaboration between the education sector and healthcare professionals, including community health nurses, can facilitate the dissemination of accurate information and promote informed decision-making among young individuals.

Additionally, policymakers and program planners may utilize these findings to develop targeted health education campaigns that not only improve knowledge but also positively influence perceptions, which are often deeply rooted in socio-cultural norms.

Overall, incorporating model-based teaching approaches into adolescent health education initiatives has the potential to contribute to improved reproductive health awareness and long-term community health outcomes.

CONCLUSION

The present study demonstrates that model-based teaching is an effective educational strategy for improving both knowledge and perception regarding consanguineous marriage and its association with reproductive health outcomes among pre-university students. The intervention led to a statistically significant enhancement in students' understanding and a positive shift in their perceptions toward the associated health risks.

These findings underscore the importance of incorporating structured, culturally sensitive educational interventions within the pre-university curriculum to address complex and socially embedded public health issues. Improving knowledge alone may not be sufficient, shaping perception is equally critical for fostering informed attitudes and future decision-making.

However, given the study design and contextual limitations, further research with controlled designs and longer follow-up periods is recommended to assess the sustainability of changes in knowledge and perception and their translation into behavioral outcomes. Overall, model-based teaching holds promise as a practical approach to promote reproductive health awareness among adolescents in similar settings.

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