Original Article

INVOLVEMENT OF CULTURAL COMPETENCE AND ETHICAL CONSIDERATIONS IN PHARMACOGENOMIC TESTING IN COMMUNITY PHARMACY

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Abstract

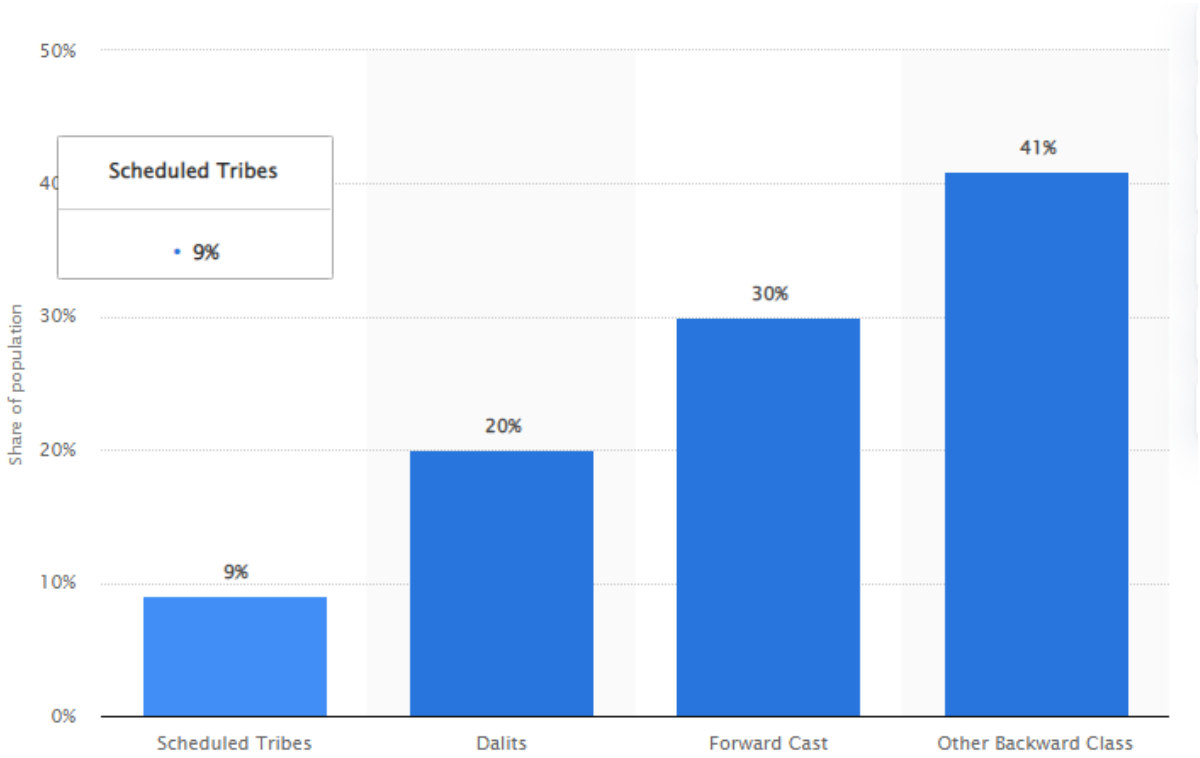
Cultural competence and ethical considerations are an important aspect that needs to be considered. In this regard, cultural competence is about an ability to understand and appreciate different people from different cultures. Ethical considerations are involved with adherence with different ethics while carrying out pharmacogenomic testing. It is unethical to carry out any type of testing on people from different cultures. The ethical considerations are approved in the form of a permission to carry out pharmacogenomic testing. The problems have been pointed where tribal populations have been facing a grave issue in the form of getting accurate treatment in the healthcare sector. The healthcare sector has certain discriminations where tribal populations do not get treatment. The pharmacogenomic testing is required to ensure cultural competence and also ethical considerations. The secondary research method has been used on account of usage of news articles and journal articles. The result and discussion have also been pointed out where 4 research studies have been considered. In this research primary research methods have not been used unlike the use of secondary research. The focus on different group of people shows that people have a significant knowledge on pharmacogenomic testing.

Keywords: pharmacogenomic testing, cultural competence, ethical considerations, right, confidentiality and others.

INTRODUCTION

The global migration has been linked with population admixture where increase of diversity evokes health disparities among minor communities. The diversity within the patient population along with cultural factors such as language, behaviours, attitudes and others encompasses cultural competence. Pharmacogenomic testing indicates study revolving around genes that have been affecting the body in response to a specific medicine (Claw *et al.* 2018). Genes are considered to be an effective aspect of a human body that has been eventually passed down from a mother as well as a father. The evaluation of a genetic makeup in relation with metabolism along with targets from different drugs is considered to be an effective method to personalise treatment of a patient. In order to understand gene makeup, it is important to understand the culture of an individual. There are community pharmacists associated with offering genotype guided therapy (Claw *et al.* 2018).

Figure 1: Distribution of tribal populations in India



(Source: Statista, 2022)

The tribal population in India has been shown with the help of health indicators where it has been reported that 84 million are scheduled castes who have been living in remote areas (Hippman, and Nislow, 2019). It has been further reported that tribal people live in remote hamlets, and hilly areas where illiteracy rates are also high. The tribal population has been stated to be progressing a lot however, it has also been seen that poverty within these tribal groups have somehow declined. Despite the fact that tribal populations in India have progressed while on the other hand, it has also been seen that there is an increase of health issues among this group of people. Rajasthan in India is the largest state where 12% of population has been found to be composed of tribal population followed by Tamil Nadu where scheduled tribes have been around 1% (Statista, 2022). The remote areas of Rajasthan and Tamil Nadu are considered to be filled with scheduled tribes where people are not getting affected by training due to lack of village practitioners. As per the above graph, it can be seen that there are around 9% scheduled tribes along with 20% dalits, 30% of forward caste in association with around 41% backward castes in the country (Statista, 2022).

India is a developing country that has certain discrimination for the different classes and castes of the peop[le who are required to be provided with equality and equity simultaneously. Deficiency of health facilities and deficiency of emergency transformation for this tribal population is witnessed in these states. There is a financial constraint where it has been reported that tribal populations have been living below the poverty line (PBL). The tribal population does not have enough funds with them thus, the tribal population from different cultures, languages and colour have not been able to obtain effective treatment in the form of pharmacogenetic testing. A study from ***National Institute of BioMedical Genomics (NIBMG)*** shows that genes of tribal populations are often tested (Hippman, and Nislow, 2019).

APPLICABILITY OF PHARMACOGENETIC TESTING

Table 1: Identification of drug class and specialty area

Clinical Specialty Area	Drug Class	Drug (s)	Relevant VIP (s)	Associated Guideline (s)
Anesthesiology	Anesthetic agents and muscle relaxants	Desflurane, enflurane, halothane, isoflurane, methoxyflurane, sevoflurane, succinylcholine	*CACNA1S*, *RYR1*	CPIC [2]
Cardiology	Anti-arrhythmics	Flecainide, propafenone	*CYP2D6*	DPWG [3,4]
	Beta blockers	Metoprolol	*CYP2D6*	DPWG [3,4]
	Statins (lipid management)	Simvastatin	*SLCO1B1*	CPIC [5] DPWG [3]
Dermatology	Anti-fungal (Aspergillosis, Candidiasis)	Voriconazole	*CYP2C19*	CPIC [6] DPWG [3,4]
Endocrinology	Hormonal contraceptives (estrogen-containing)	Combined injectable contraceptive, contraceptive patch, NuvaRing, oral contraceptive pill	*F5*	DPWG [3,4]
	Protein "potentiator" (cystic fibrosis treatment)	Ivacaftor	*CFTR*	CPIC [7]
Gastroenterology	Anti-fungal (Candidiasis)	Voriconazole	*CYP2C19*	CPIC [6] DPWG [3,4]
	Anti-emetic	Ondansetron, tropisetron	*CYP2D6*	CPIC [8]
	Protein "potentiator" (cystic fibrosis treatment)	Ivacaftor	*CFTR*	CPIC [7]
	Proton pump inhibitors	Lansoprazole, omeprazole, pantoprazole	*CYP2C19*	DPWG [3,4]
Gynecology	Anti-fungal (Candidiasis)	Voriconazole	*CYP2C19*	CPIC [6] DPWG [3,4]
Hematology	Anti-thrombotic (anticoagulant/antiplatelet)	Acenocoumarol, clopidogrel, phenprocoumon, warfarin	*CYP2C19, CYP2C9, CYP4F2, VKORC1*	DPWG [3,4] CPIC [9,10] CPNDS [11]
Immunology	Anti-retroviral (HIV treatment)	Abacavir, atazanavir	*HLA-B, UGT1A1*	CPIC [12,13] DPWG [3,4]
	Anti-viral (hepatitis C, RSV, viral hemorrhagic fever treatment)	Peginterferon alfa-2a, peginterferon alfa-2b, ribavirin	*HLA-B, IFNL3*	CPIC [14] DPWG [4]
	Immunosuppressant (eczema, rheumatoid arthritis treatment, lowers risk of organ rejection following transplant)	Azathioprine, mercaptopurine, tacrolimus, thioguanine	*CYP3A5, TPMT*	CPIC [15,16] DPWG [3,4]
Nephrology	Anti-gout agent (also kidney stones treatment)	Allopurinol, rasburicase	*G6PD, HLA-B*	CPIC [17,18] American College of Rheumatology [19]
Neurology	Anti-convulsant	Carbamazepine, phenytoin, oxcarbazepine	*CYP2C9, HLA-A, HLA-B*	CPIC [20,21] CPNDS [22] DPWG [3,4]
	Anti-fungal (CNS fungal infections treatment)	Voriconazole	*CYP2C19*	CPIC [6] DPWG [3,4]
	Opioid analgesics	Codeine, tramadol	*CYP2D6*	CPIC [23] DPWG [3,4] CPNDS [24]

(Source: Hippman, and Nislow, 2019)

The genes are tested to understand what type of medicine can be used for anesthetic agents. The applications of pharmacogenetic testing can be understood through clinical specialties and also through human aspects. Rahma *et al.* (2020) stated that for the clinical area of anesthesiology, the use of drug class in the form of anaesthetic agents along with muscle agents can be used. The drug class that has been used for cardiology is anti-arrhythmics, statins and others. There is another specialty area such as dermatology where anti-fungal as a drug has been used to treat the individuals. Pharmacogenetic tests often do not contain any evidence therefore clinical decisions on account of such tests cannot be considered. However, on the other hand, the test is considered to be effective for improving treatments that have been tailored with genetic makeup. However, pharmacogentic tests are required to be carried out ethically among different cultures.

CULTURAL COMPETENCE FOR PHARMACOGENOMIC TESTING

The healthcare providers employing cultural competence are trying to eliminate health disparities for ensuring care to the patients. Cohn *et al.* (2021) stated that diversity among people has been affecting patient outcomes where community pharmacists are required to understand gene makeup of the people from different cultures. The cultural values, along with disease incidence and also prevalence and treatment efficacy are considered to implement pharmacogenomic testing. The traditional beliefs of a patient often differ from decisions that have been made in the medical field. As belief varies from medical decisions therefore, it also affects the point of view towards consideration of genetic results. There are some racial categories that have the ability to distinctly different populations usually possess high along with low prevalence of different genes.

Kurnat-Thoma, (2020) argued that cultural humility is another aspect that is completely opposite to cultural competence. Cultural humility is an effective process through which relationships can be built on account of self-discovery and also discovery. Cultural competence is one of the ability to ensure that participation of the people is ethical and also effective within a personal as well as professional setting. In simple words, it can be stated that health disparities can be removed effectively through adoption of cultural competence where a community pharmacist will not diagnose the genes to offer medicine in the personal along with professional settings. It is an aspect of community pharmacy where genes are not required to be tested to carry out among a community of people to carry out the pharmacogenomic tests.

ETHICAL CONSIDERATIONS FOR PHARMACOGENOMIC TESTING

The genes will be diagnosed and experimented and pharmacogenetic testing cannot be carried out unethically. According to the words of Qureshi *et al.* (2021), the ethical considerations in the form of informed consent where the individual considered for this type of test needs to be informed to make the individual understand the relevance of the test and carry out that test effectively without any kind of prohibitions. The right towards information is another ethical aspect where the individual has the right to get every form of information regarding pharmacogenomic testing. Disclosure of vital information on the test is required to be provided to the individual to make the individual understand the pharmacogenomic testing process. Confidentiality, privacy and others have been assumed for this testing.

GENES AND MEDICIONES WITHIN PHARMACOGENOMIC TESTING

Table 2: Identification of medicines and genes within the human body

Medicine	Genes
Warfarin: a blood thinner	CYP2C9 and VKORC1
Plavix, a blood thinner	CYP2C19
Antidepressants, epilepsy medicines	CYP2D6, CYPD6 CYP2C9, CYP1A2, SLC6A4, HTR2A/C
Tamoxifen, a treatment for breast cancer	CYPD6
Antipsychotics	DRD3, CYP2D6, CYP2C19, CYP1A2
Treatments for attention deficit disorder	D4D4
Carbamazepine, a treatment for epilepsy	HLA-B*1502
Abacavir, a treatment for HIV	HLA-B*5701
Opioids	OPRM1
Statins, medicines that treat high cholesterol	SLCO1B1
Treatments for childhood leukemia and certain autoimmune disorders	TMPT

(Source: Influenced by Qureshi *et al.* 2021)

Genes are considered for the same reason that the same does have an effect on people in various ways. The medicines and dosages of those medicines can easily be understood through pharmacogenomic testing. The above table shows different varieties of medicine such as warfarin that is used after identifying a specific type of gene such as CYP2C9 and VKORC1. Phillips *et al.* (2018) argued that warfarin is considered to be an important blood thinner. On the other hand, it can be seen in the table that Tamoxifen is another medicine that has been used for treating the people suffering from breast cancer.

The gene that has been identified for treating breast cancer among people is CYPD6. Gálvez-Peralta *et al.* (2018) opined that Carbamazepine is a medicine that is used for treating epilepsy after specifying the gene such as gene such as HLA-B*1502. The association of cultural competence with these genes and medicines is most important to understand where in case of failure

to recognise these genes; the treatment process will go wrong. Cultural competence and ethical considerations are about considering every individual for carrying out the test. It is about an amalgamation of different cultures after identifying genes and what type of medicine is required to treat the patient to obtain patient outcomes.

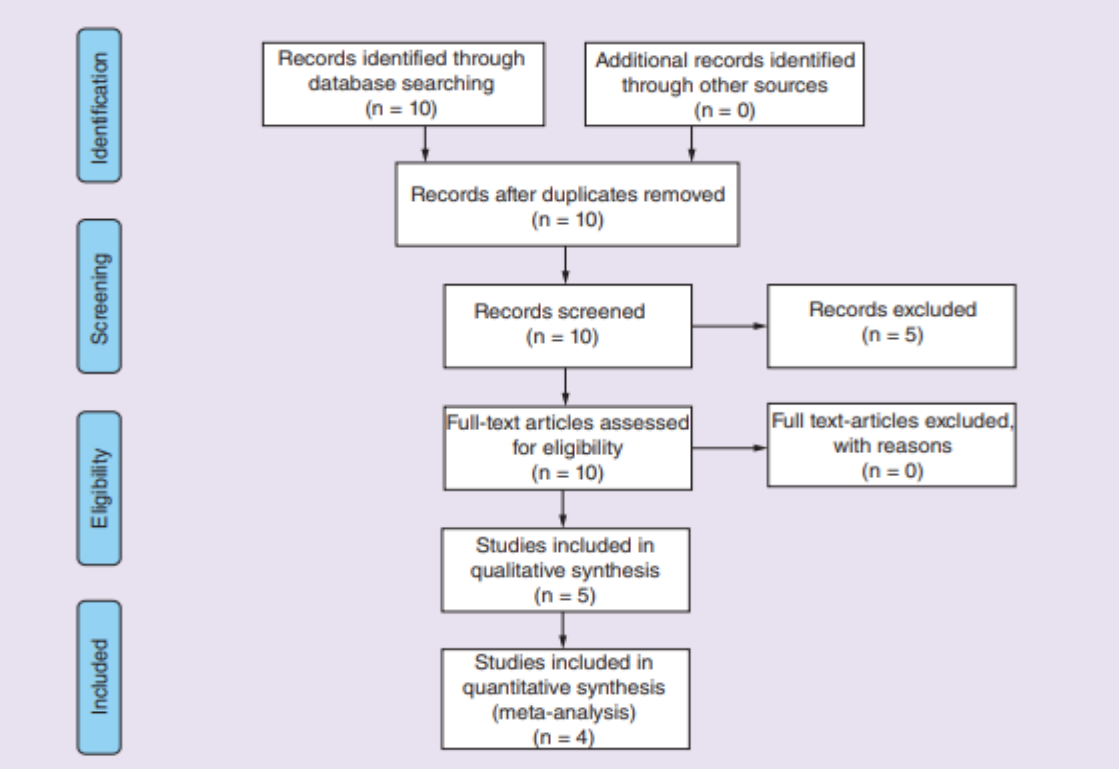
METHODS

Secondary methods have been used for this research article for collecting qualitative data. The secondary method for obtaining qualitative data in the form of non-numerical and numerical data has been used in this research. Books, articles and others have been used to obtain data through secondary methods. A journal article has been selected from where methods have been studied to understand the methodology that has been used within the research article. Meta-Analysis is a specific method within a secondary method based on which quantitative data have been analysed to understand variant responses within a specific group. Meta-analysis has not been used in this article rather systematic reviews have been used for this article. It has been further seen that random control trials (RCT) have been utilised to select the journals for the secondary method. Meta-analysis has been further performed for the respective four studies out of which two open label studies have been further considered (Persad, and Emanuel, 2021).

Systematic review is about selection of different articles through which qualitative data have been obtained over quantitative data as per meta-analysis. Heterogeneity has been used for testing Q-statistic while magnitude has been measured through I2 statistics. The result that has been obtained was 25% small heterogeneity along with 50%, moderate heterogeneity and also 75%, high heterogeneity (Persad, and Emanuel, 2021). Comprehensive Meta-Analysis (CMA) software is often considered to be the best software for obtaining quantitative data. This type of software has not been used in this article where systematic review on those three selected articles has been considered to evaluate overall research.

FINDINGS AND ANALYSIS

Figure 2: Selection criteria of journals



(Source: Influenced by Persad, and Emanuel, 2021)

In the above image, 10 articles have been selected and those articles have been screened carefully where 5 articles out of around 10 articles have been excluded. At the end, there are only four articles that have been considered as pointed in the above image to consider the journal articles especially on secondary methods. The records have been screened and excluded. It is through qualitative and quantitative synthesis, the articles have been finally selected for this research article. According to the opinion of Frigon *et al*. (2019), Magnetic resonance imaging (MRI) is considered to be an effective technique for treating Episcleral plaque brachytherapy (EPB). This article shows the MR images where six patients have been considered and have been prescribed with 85 Gy. Pre- and post-implant scans show the results to generate out "pre-plans" and "post-plans". In respect of pre-plans, the digital plaque model has been used to understand the position of the tumour, nerve along with others. In this regard, the gene has been identified to understand the position of tumour, nerve and others.

The medicines have been prescribed to the patients after encountering tumour formation among them. The six patients that have been considered for MRI have cultural competency among them where ethical considerations such as privacy, confidentiality and others have been considered to conduct the pharmacogenomic testing. There has been no unethical practices that have been considered for this test. Goodman, and Brett, (2021) argued that the approach on ground theory has been considered to consider focus groups that have been composed of 4 people. The knowledge and perceptions revolving around genomics and pharmacogenomics have been asked among those 4 people where it has been found that there is an inpatient along with outpatient setting. The participants hold post-graduate qualifications where these participants do possess any sufficient knowledge on genome and also on pharmacogenomics. However, it has been found that the knowledge of some pharmacists on account of genome medicine along with on pharmacogenomics has been one of the important themes.

The focus group contains a certain amount of knowledge on this subject which means that people have the capability for cultural competence and thus, interaction with them will revolve around possession of knowledge among the community pharmacists in a community pharmacy. Indigenous people have always been underrepresented within the genomic research studies for different types of reasons where iot has been found that researchers always fail to interact with indigenoiuys people. Goodman, and Brett, (2021) stated that there is a lack of transparency and mistrust among these people have prohibited them to examine their genes and get effective medicine through pharmacy. Genome Diversity Project another important project where human genetic diversity along with global migration patterns have been studied to ensure cultural competence within an ethical setting. However, even this project has essentially failed to understand the social and political implications of inhuman testing of genes. In simple words, it can be further understood that without seeking permission from tribal populations in most parts of the country, the pharmacogenomic testing has been carried out unethically.

CONCLUSION

The articles have pointed out the problems that have been witnessed in a few states of the country; Rajasthan and Tamil Nadu are considered to be some important states where growth of the tribal populations have been witnessed. The research is important to point out the discrimination that has been further witnessed within different cultures. The important of cultural competence is about involving every individual without any kind of discrimination. The different concepts involved with this topic have been discussed where specific concepts have been further linked with each other to understand it. The secondary method, especially systematic review or meta-analysis as the CMA software have not been used for this research. The secondary sources have been considered over primary sources for this research however, primary data have been obtained from secondary articles especially for this study.

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