REVIEW OF LITERATURE

Borass JC, Messer LB, Till MJ\textsuperscript{31} in 1988 had measured the genetic variance of several dental characteristics in twins reared apart. They had concluded that higher similarity in dental decay, tooth size and malalignment was observed in monozygotic twins then compared to the dizygotic twins.

Conry JP, Messer LB, Boraas JC, Aeppli DP, Bouchard TJ Jr\textsuperscript{32} in 1993 had conducted a study in which they had assessed characteristics like the number of teeth present, number of teeth and surfaces restored and dental caries in 46 monozygotic twin pairs and 22 dizygotic twin pairs who were reared apart. In this study they had eliminated the effect of common environmental factors. They had observed a significant genetic variance in monozygotic twins for the existence of dental caries, the number of teeth present and the number of teeth restored.

Mueckler M, Kruse M, Strube M, Riggs AC, Chiu KC, Permutt MA\textsuperscript{33} 1994 assessed the effect of poly morphism of threonine 110-isoleucine and valine 197–isoleucine on the expression of Glut2 gene was tested by expression of the mutant proteins in xenopus oocytes. They had observed that the defect in glut2 expression is a result of the mutation of valine–isoleucine polymorphism thus resulting in non-insulin dependent diabetes.

Arnadottir IB, Rozier RG, Saemundsson SR, Sigurjons H, Holbrook WP\textsuperscript{34} 1998 examined the effect of the sugar consumption on the proximal caries in teenagers residing in Iceland. High risk of dental caries occurrence was observed in the subjects where consumption of sugar between the meal and total sugar frequency consumption was more.

Nelson G, Hoon MA, Chandrashekar J, Zhang Y, Ryba NJ, Zuker CS\textsuperscript{21,2001} had reported the characterization of mammalian sweet taste receptors. Initially they had conducted trans genic rescue experiments that had proved T1R3 as sac gene through the heterologous expression system. They had demonstrated that both T1R2 and T1R3 combined together to function as a sweet receptor thus they had analysed the patterns of T1Rs and T2Rs thus they provided representation of sweet and bitter taste at the periphery.
Liem DG, Mennella JA. 2002 determined the preference level of sweet and sourness in children by using forced choice sip and swallow procedure. The level of sweetness and sourness was assessed in juice. A high level of citric acid in the juice was preferred by children who were fed by protein hydrolysate formulas. They concluded that wide variety of experimental factors influence preferences of flavor during childhood.

Lin BP. 2003 has conducted a study to assess the prevalence of dental caries among the children with different genetic ability to taste bitter and sweet substances by using a filter paper containing 6-n-propylthiouracil. It was observed that prevalence of caries was more in non tasters than in medium tasters and super tasters. They concluded that over all caries experience was dependent on the individuals taste.


Conducted a study on human brain specimens. The in situ hybridization histo chemistry procedure conducted on these brain specimens revealed the localization of GLUT2 and GK m rnas in human brain. RNA isolation from different parts of brain and then they had subjected this to PCR amplification, which had aided in identifying products of predicted size in human hypothalamus, cerebral cortex and rat liver. The presence of the PCR products in different parts of the brain was confirmed by conducting Southern blot analysis. Glucose phosphorylating activities were detected in different areas of human brain and rat liver by using radiometric method.

Liem DG, de Graaf C. 2004 investigated the taste preferences of children of age group 6 to 11 years and in young adults by exposing them repeatedly with either sweet orangeade, sour orange ade or no orange ade. The preference was measured by rank ordering procedure. After an 8 day exposure significant increase in preference for sweet organeade and for yoghurt with 0.42 M
sucrose was observed while no significant effect on taste preference was observed in the children exposed to orangeade.

Patir A, Seymen F, Yildirim M, Deeley K, Cooper ME. 2008 Conducted a study in 173 children between the age group 3-6 years. 91 children with 4 or more decayed or filled tooth surfaces and 82 children with no evidence of caries or white spot lesions were selected as controls. DNA was extracted from saliva samples. Genotyping was done for genes involved in enamel formation. As compared to the control groups higher dmft scores and overrepresented were present in the C allele of the amelogenin marker, the T allele of ameloblastin marker and CT genotype of tuftelin rs3790506. They had concluded that caries susceptibility was due to variation in amelogenin, ameloblastin and tuftelin genes.

Rupesh. S, Nayak U.A. 2006 carried out PROP testing by using a filter paper containing 6-n propylthiouracil in 340 children. On the basis of intensity of the bitterness to PROP these subjects were divided into super tasters, medium tasters and non tasters. The caries susceptibility in these subjects was determined by the percentage of decayed, missing and filled surfaces. They had concluded that coronal caries was significantly higher in non tasters than in medium and super tasters.

Hedge AM, Sharma A. 2008 carried out PROP sensitivity test among 500 children of 8-12 years to determine caries experience and body mass index were determined. Dietary habits were evaluated by the questionnaire given to these subjects. The results showed that higher caries experience and body weight were observed in non tasters. Hence they conclude PROP test was considered as a useful tool in identifying children susceptible to obesity and dental caries.

Eny KM, Wolever TM, Fontaine-Bisson B, El-Sohemy A. 2008 conducted a study in two different populations to assess that individuals with genetic variation in GLUT2 had a higher daily intake of sugars. Individuals with Thr/Thr genotype constitute the first population. Food records for 3 days were observed in these individuals, they exhibited a significantly higher intake of sugars. Similarly an increased intake of sugar consumption over one month period was observed in the individuals of the second population who are the carriers of the Ile allele. They
concluded that habitual consumption of sugars was due to the genetic variation in GLUT2, this contributes to the underlying glucose sensing mechanism that regulates food intake.

Eny KM, Wolever TM, Corey PN, El-Sohemy A. 2010 conducted a study in two populations where the first population included 1037 young adults who were not affected by diabetes and the dietary intake in these individuals was assessed by using 196 item food frequency questionnaires for 1 month. The second population included 100 individuals with type II diabetes mellitus. In these individuals, dietary intakes were assessed by using 2 sets of 3-d food records administered 2 weeks apart. The anthropometric measurements of all the individuals were obtained to calculate the BMI. A physical activity questionnaire was used to measure the modifiable activity. Genotyping for Ser9Cys (rs9701796) and Ile 191val (rs35874116) polymorphisms in TAS1R2 and Thr 110Ile (rs5400) polymorphism in GLUT2 were detected by Taqman allelic discrimination assay. They had concluded that lower consumption of sugars in the Val allele carriers for Ile 191 Val polymorphism of TAS1R2 was observed in overweight and obese individuals of 2 distinct populations.

Kukletova M, Izakovicova Holla L, Musilova K, Broukal Z. 2012 conducted a cross sectional study to assess the DMFT scores, gingival index plaque index, and calculus index in adolescents selected from European longitudinal study of pregnant women and children. A statistically significant association existed in gingival index and the DMFT, and particularly between gingival index and severity of orthodontic anomalies.

Allen AL, McGeary JE, Knopik VS, Hayes JE. 2013 assessed the difference in bitterness of acesulfame potassium among the 108 individuals by genotyping for the functional SNPS in TAS2Rsi.e. the bitter taste receptor gene. They have observed that two SNPS each from TAS2R9 and TAS2R31 contribute in variance to perceive the bitterness.

Allen AL, McGeary JE, Haves JE. 2014 assessed the relationship between ethanol sensations and polymorphisms in genes for bitter taste receptor TAS2RS and TRPV1 polymodal nociceptor. It was found that three SNPS (rs224547, rs4780521, rs161364) of TRPV1 and SNP rs1015443 of
TAS2R38 were associated with whole mouth ethanol sensations. Thus it was concluded that the genetic variations in TRPV1 and TAS2Rs genes may be responsible for the perception to the alcoholic beverages.

Kulkarni GV, Chng Z, Eny KM, Nielsen D, Wess man C, El-Sohemy A\textsuperscript{28} 2013 determined the association of caries with polymorphisms of TAS1R2 and GLUT2 gene in 80 caucasians individuals. They had assessed the caries prevalence using ICDAS, DMFT and DMFT + Xrays. They concluded that high caries risk was associated with the GLUT2 and TAS1R2 genotypes either when they are occurring individually or in combination.

Holla.IL, LP Borilova, Lucanova.S K Jakub, M Kristina, B.Michaela et al\textsuperscript{29} 2015 conducted a study in 637 Caucasian children to determine the association of the polymorphisms of TAS1R2 and GLUT2 genes in dental caries. They had concluded that TAS1R2 (Ile191Val, rs35874116) and GLUT2 (Thr110Ile, rs5400) exhibited high risk for dental caries.

Antonietta R.,Lorenzo B, Nicola P, Roberta S, Roberta L, Gasparini P, Ottavia NC\textsuperscript{30}. in 2015 conducted a study in 647 caucasians adults to determine the association the sweet perception to dental caries seen in individuals with GLUT2 and TAS1R2 genes.
SUMMARY OF REVIEW OF LITERATURE

With the existing knowledge of literature it is concluded that numerous factors such as diet, salivary flow, oral hygiene, and positional characteristics affect caries susceptibility in an individual. Apart from the above factors genes by interaction with environmental factors contribute to caries susceptibility. A set of genes such as amelogenin, enamelin, ameloblastin, tuftelin, and dentin sailophosphoprotein influence the resistance of the enamel. Polymorphisms of proline rich proteins and lactotransferrin genes present in saliva are associated with caries experience. TAS1R2 and TAS1R3 genes are associated with sweet taste perception. Bitter perception is associated with TAS2R38 gene. High caries risk is found in Caucasians where polymorphisms of TAS1R2 and GLUT2 genes are present.

LACK OF LITERATURE.

When genetic basis for dental caries is studied complex segregation analysis (CSA). Very few Studies included both parametric and non-parametric linkage analysis but the authors did not include CSA to detect genomic regions containing genes for dental caries.

Polymorphism of GLUT2 and TAS1R2 gene in caries susceptibility was studied in Caucasians individuals, thus the association of these genes on caries risk has to be assessed in individuals of different ethnic background. None of the studies showed the association of the factors such as oral hygiene, socioeconomic status, and fluoride exposure with the dental caries in individuals with polymorphisms of GLUT2 and TAS1R2 genes.