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A cross-sectional study on oral health status of young adults in Turkish population

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ABSTRACT

The purpose of the study is to bring out the oral health status and awareness of young adult population living in different regions of Anatolia. Army recruits aged 19 to 25 years were sampled and a 7 items questionnaire (3 of them was Health Insurence Study (HIS) questions) not including private questions such as name, address, etc; were presented to 2320 randomly selected recruits to bring out the prevalence and incidence of tooth loss, awareness of missing teeth, oral health and its effect on life quality, frequency of dental visits and the reasons of non-regular visits of young adult population in Turkey. For all education group and geographical region, 57.8% volunteers had no missing teeth and in the remainder had at least one missing teeth. Only 2.3% of the volunteers go to a dentist office for control (regularly). 35% of them was disregardful of their oral health and 24.2% of them answered "I don't know that I should go regularly". While college graduate population had 7 median value, primary school and secondary school graduates had median score of 8. There was statistically significant difference between them ($p<0.05$). Increasing pain complaints ensure the reduction of index score. The results illustrated, further investigations should be performed on oral health status of the young population and the effect of oral health status on an individual's life quality is not well known by Turkish young population.

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1. Introduction

Today, it is known that oral and dental health has a significant impact on quality of life and oral disorders can effect physical, social and psychological well-being. According to definition of Yewe-Dwyer (1993); oral health is a state of the mouth and associated structures where disease is contained, future disease is inhibited, the occlusion is sufficient to masticate food and the teeth are of a socially acceptable appearance. Clinical indices such as dentate status, decayed, missing, and filled rates, and periodontal indices do not completely assess the functional, social, and psychological impact of dental disease on individuals or populations (Dolan et al., 1991). The work of Cushing et al. (1985), Locker and Gruska (1987), and Rosenberg et al. (1988) suggest that oral disease negatively impacts physical, behavioral, social and psychological health.

The work of Cushing et al. (1985), Locker and Gruska (1987), and Rosenberg et al. (1988) suggest that oral disease negatively impacts physical, behavioral, social and psychological health.

Health status measurement was advanced in the 1980's with the work of Ware, Brook, Davies-Avery and colleagues (1979) as part of the Rand Health Insurance Study (HIS). The HIS is a large-scale social experiment designed to study the effects of health insurance on the use of health services, health status, and attitudes toward care. For this purpose the participants' physical, mental, social, general health conditions were evaluated. HIS participants were also asked three dental items intended to quantify the amount of pain, worry, and concern with social interactions (i.e., avoidance of conversation) attributed to problems with teeth or gums. Although there are lots of methods and questionnaires in the literature, HIS questions addressed major consequences of dental disease, namely pain and distress, worry or concern, and reduced social interactions.

In addition to this, regular dental attendance would seem to be an appropriate course of action to prevent tooth loss and maintain dental function and oral health (Sheiham et al., 1985). Few studies which have examined oral health in patients attending general dental practices suggest that regularly attending patients experience benefit from care when compared with those attending less regularly (Richards and Scourfield, 1996; Bullock et al., 2001). Studies concerning prevalence and incidence of tooth loss in young adults provide essential epidemiological data. The information obtained may be used to assess the state of dental health and form a baseline for planning future dental care programs in the society. Salzmann (1969) stated that "the epidemiologic determination of a disease is the first step in public health endeavours". According to Todd and Walker (1980) dental health can be estimated to an extent, by the study of total tooth loss.

Unfortunately, in Turkey there is a lack of data regarding the oral condition of the young adults living in different socio-economic and geographical region. Cross-sectional studies of military populations provide a unique opportunity to capture a sample of young adults from diverse socio-economic and geographical backgrounds and observe their oral health status. (Hopcraft and Morgan, 2003).

The purpose of the present investigation; to bring out the prevalence and incidence of tooth loss, awareness of missing teeth, oral health and its effect on life quality, frequency of dental visits and the reasons of non-regular visits of young adult population in Turkey.

2. Materials and methods

This study was reviewed and approved by Director of Medical Service and Ethics Committee approval was taken from Ethics Committee of Gülhane Military Medical Academy in February 6, 2013 and session no:13.

In Turkey, compulsory military service applies to all male citizens from twenty to forty one years of age. This paper reports the findings of a cross-sectional study of Army recruits examined at the 1st Recruit Training. The subjects were examined over a period of one months as they enlisted into the Army, and comprised subjects from all seven geographical region of Turkey.

Army recruits aged 19 to 25 years were sampled in March 2013 at the time of their attendance at the Transportation and Military Personnel School of the Turkish Armed Forces localized in Izmir/Gaziemir.

The majority of recruits were enlisted from Marmara Region (24.7%), Mediterranean Region (15.9%) and Central Anatolia Region (24.4%), with the remainder from Southeastern Anatolia Region (6.3%), Eastern Anatolia Region (6.8%), Aegean Region (8.6%) and the Black Sea Region (13.3%).

The illiterates and who did not understand the questions among volunteers and who had psychological disorders determined by psychological counseling and guidance department were excluded. To avoid potential information bias, participants were told specifically that the study had no impact on their military service. Before the questionnaire a document was handed out to the recruits with information about the aim of the study, the study methods and aspects concerning their participation. This allowed the participants to ask questions about their participation. The recruit groups in each 15 person completed the questionnaires on the respective desks under the supervision of three medical assistants and in the absence of the commander to ensure confidentiality and to reduce response bias. After the questionnaire dental examinations were performed by dentist who planned this study. Subjects were examined with a mouth mirror and explorer under a standard dental unit light for the purpose of being made dentally fit for military purposes.

A seven item questionnaire not including private questions such as name, address, etc; were presented to 2320 randomly selected recruits. Three of them were HIS questions. They were written to represent factors contributing to the adverse effects of dental disease on individuals. First, depending on the severity of their condition, persons with large carious lesions and periodontal disease are expected to experience increasing levels of pain. In particular, acute pain is expected

Table 1. A copy of questionnaire form translated into English.

AGE : **EDUCATION :** **REGİON :**
HIS QUESTIONS
1) DURING THE PAST 3 MONTHS, HOW MUCH PAIN HAVE YOUR GUMS OR TEETH CAUSED YOU?
(Circle one)
A great deal of pain 1
Some pain 2
A little pain 3
No pain at all.....4
2) DURING THE PAST 3 MONTHS, HOW MUCH HAVE YOUR TEETH OR GUMS WORRIED OR CONCERNED YOU?
(Circle one)
A great deal 1
Somewhat 2
A little.....3
Not at all.....4
3) DURING THE PAST 3 MONTHS, HOW MUCH OF THE TIME HAVE PROBLEMS WITH THE WAY YOUR TEETH OR GUMS LOOK CAUSED YOU TO AVOID CONVERSATION WITH PEOPLE?
(Circle one)
Most of the time 1
Some of the time 2
A little of the time 3
None of the time 4
4) ACCORDING TO YOU, HOW MANY MISSING TEETH DO YOU HAVE IN YOUR MOUTH? (EXCEPT WISDOM TEETH)
Answer : .....
5) HAVE YOU BEEN IN A CLINIC FOR CONTROL OR TREATMENT FOR THE LAST ONE YEAR?
Yes
No
6) HOW OFTEN DO YOU GO TO DENTIST?
For control (regularly).
For control (occasionally).
Only when I have some problem with my teeth, gum or when I have oral disease.
I have never gone to a dentist before in my life.
7) IF YOU AREN'T VISITING THE DENTIST REGULARLY, WHAT CAN BE THE PROBABLE CAUSE?
I don't have health coverage or because of economic limitations.
I don't know that I should go regularly.
In general, I have confidence issues about physicians
Because of fear from dentist.
I am disregardful of my oral health.

Table 2. Frequency and percentage distributions of different educational levels.

HIS questions		Primary School	High School	College
Q-1	A great deal of pain	73 (6.4%)	40 (4.6%)	15 (4.9%)
	Some pain	283 (24.6%)	215 (24.8%)	88 (28.9%)
	A little pain	282 (24.5%)	263 (30.4%)	77 (25.2%)
	No pain at all	511 (44.5%)	348 (40.2%)	125 (41.0%)
Q-2	A great deal	309 (26.9%)	224 (25.9%)	92 (30.2%)
	Somewhat	432 (37.6%)	344 (39.7%)	124 (40.7%)
	A little	224 (19.5%)	191 (22.1%)	58 (19.0%)
	Not at all	184 (16.0%)	107 (12.4%)	31 (10.2%)
Q-3	Most of the time	239 (20.8%)	184 (21.2%)	81 (26.6%)
	Some of the time	258 (22.5%)	212 (24.5%)	64 (21.0%)
	A little of the time	288 (25.1%)	248 (28.6%)	83 (27.2%)
	None of the time	364 (31.7%)	222 (25.6%)	77 (25.2%)

to be associated with pulpitis and periodontal abscesses, and chronic pain with tooth mobility. Other symptoms associated with oral diseases (e.g., bleeding gums) may also cause worry and anxiety. In addition, loss of multiple teeth may cause discomfort because of difficulty in chewing. Finally, caries and periodontal disease and subsequent loss of teeth may cause concern with appearance, lower self-esteem, and negative effects on social activities and personal interactions.

Responses to the pain and worry questions range from "not at all" (or equivalent hywording) to "a great deal." Responses to the question about conversation avoidance range from "none of the time" to "most of the time". The index score is a simple sum of the three response values, with a possible range of 3 to 12.

To find out if the participants know the number of missing teeth in their mouths, "According to you, how many missing teeth do you have in your mouth? (except wisdom teeth)" question was added the questionnaire. The number of missing teeth were recorded on questionnaire form by investigator during the examination for each participants. To survey the young populations dental visits frequency and the reasons not to take proper oral health service, other two questions were added. The questionnaire form is shown in Table 1. Statistical analyzes were performed by using IBM SPSS Statistics 21 computer programme. Statistical analyzes were performed by using IBM SPSS Statistics 21 (Chicago, USA).

3. Results

The normality of the results were examined by using Kolmogorov-Smirnov test. Group comparisons of quantitative data was performed by using Kruskal-Wallis and Mann-Whitney U test. Qualitative data analysis was performed Chi-square test. The data was presented as median(min-max) and frequency values. Significance level was taken as $p<.05$.

49.5% (n=1149) of volunteers were primary school, 37.3% (n=866) of volunteers were high school and 13.1% (n=305) of them were junior college graduates.

For all education groups and geographical regions, 1340 (57.8%) volunteers had no missing teeth and 460 (19.8%) of them had 1, 317 (13.7%) of them had 2, 125 (5.4%) of them had 3, 44 (1.9%) of them had 4, 15 (0.6%) of them had 5, 11 (0.5%) of them had 6, 5 (0.3%) of them had 7 and 3 (0.1%) of them had 8 missing teeth. When considering the tooth loss, no significant difference was found among the educational levels and geographical regions. To find out if the participants know the number of missing teeth in their mouths, "According to you, how many missing teeth do you have in your mouth? (except wisdom teeth)" question was asked. The results were; 14.1% of the primary school graduate 16.2% of the high school graduate and 14.4% of the junior college graduate volunteers answered wrong missing teeth number and according to Chi-Square test results, there was no statistically significant difference among education levels (p=0.421). In addition to these results, considering different geographical region, Eastern Anatolia Region (19.7%) and Southeastern Anatolia Region (17.7%) exhibited the highest ratio of not to be aware of their missing teeth. The lowest ratio (11.6%) was observed in Aegean Region. However, according to Chi-Square test, no statistically significant difference was found among different geographical regions (p=0.170).

790 (34.1%) volunteers answered 'Yes' the question of " Have you ever been in a dentist office for control or treatment for the last one year". 1530 (65.9%) of them answered the same question 'NO'. Education levels comparisons were made with Chi-Square test and there was statistically significant difference for dental attendance for the last year (p=0.00). Junior college graduate volunteers exhibited

Table 3. Frequency and percentage distributions of different geographical regions

HIS questions		Geographical Regions						
		Black Sea	Marmara Region	Aegean Region	Mediterranean Region	Central Anatolia Region	Eastern Anatolia Region	Southeastern Anatolia Region
Q-1	A great deal of pain	20 (6.5%)	30 (5.2%)	8 (4.0%)	17 (4.6%)	24 (4.2%)	20 (12.7%)	9 (6.1%)
	Some pain	76 (24.6%)	140 (24.4%)	42 (21.1%)	105 (28.5%)	134 (23.7%)	35 (22.3%)	54 (36.7%)
	A little pain	84 (27.2%)	145 (25.3%)	64 (32.2%)	91 (24.7%)	166 (29.3%)	36 (22.9%)	36 (24.5%)
	No pain at all	129 (41.7%)	258 (45.0%)	85 (42.7%)	156 (42.3%)	242 (42.8%)	66 (42.0%)	48 (32.7%)
Q-2	A great deal	83 (26.9%)	159 (37.9%)	58 (29.1%)	116 (31.4%)	130 (23.0%)	45 (28.7%)	34 (23.1%)
	Somewhat	117 (27.7%)	198 (34.6%)	83 (41.7%)	150 (40.7%)	231 (40.8%)	51 (32.5%)	70 (47.6%)
	A little	67 (21.7%)	136 (23.7%)	34 (17.1%)	61 (16.5%)	126 (22.3%)	26 (16.6%)	23 (15.6%)
	Not at all	42 (13.6%)	80 (14.0%)	24 (12.1%)	42 (11.4%)	79 (14.0%)	35 (22.3%)	20 (13.6%)
Q-3	Most of the time	57 (18.4%)	117 (20.4%)	42 (21.1%)	98 (26.6%)	127 (22.4%)	35 (22.3%)	28 (19.0%)
	Some of the time	68 (22.0%)	129 (22.5%)	46 (23.1%)	81 (22.0%)	134 (23.7%)	31 (19.7%)	45 (30.6%)
	A little of the time	94 (30.4%)	142 (24.8%)	62 (31.2%)	94 (25.5%)	145 (25.6%)	47 (29.9%)	35 (23.8%)
	None of the time	90 (29.1%)	185 (32.3%)	49 24.6%)	96 (26.0%)	160 (28.3%)	44 (28.0%)	39 (26.5%)

Table 4. HIS questions scores for different educational levels.

Educational levels	N	Median	Minimum	Maximum
Primary school	1149	8.0000	3.00	12.00
High school	866	8.0000	3.00	12.00
Junior college	305	7.0000	3.00	12.00
	2320	8.0000	3.00	12.00

higher attendance (45.2%) than high school (36.7%) and the lowest attendance was observed in primary school graduate volunteers (29.1%).

The sixth question was "How often do you go to dentist?". 54 (2.3%) recruits answered "For control (regularly)", 332 (14.3%) recruits answered "For control (occasionally)", 1651 recruits answered " Only when I have some problem with my teeth, gum or when I have oral disease", and the reminder 283 (12.2%) person answered " I have never gone to a dentist before in my life. In general, according to Chi-Square test, different education levels effected the dental attendance frequency (p=0.00) and primary school graduates exhibited the lowest regular attendance among the groups (1.4%) and also geographical regions (p=0.01) affected the dental attendance frequency of the volunteers.

The last question was " If you don't visit the dentist regularly, what can the probable cause be?". 392 (16.9%) of them answered "I don't have health coverage or because of economic limitations", 561 (24.2%) of them answered " I don't know that I should go regularly", 294 (12.7%) of them answered " In general, I have confidence issues about physicians", 209 (9%) of them answered " Because of fear from dentist", and remaining 812 (35%) answered" I am disregardful of my oral health.

As mentioned before the index score of HIS is a simple sum of the three response values, with a possible range of 3 to 12 (Fig. 1). Frequency and percentage distribution's of HIS questions for all educational levels and geographical regions are seen in Table 2-3.

Considering the level of education, multiple comparisons of the groups were made with Kruskal-Wallis Test. According to test there was statistically significant difference among the education levels (p=0.039) and no significant difference was found among geographical regions. Paired comparisons of the education levels were made with Mann-Whitney Test. According to test, junior colleague graduate population had statistically low index score value when comparing with primary school graduate population (p=0.015). There was no statistically significant difference between junior colleague and high school graduate population (p=0.118) and between high school and primary school graduate population (p=0.183). Median values are seen in table 4. A total of 186 volunteers (8.02 %) had no pain, no worry and no conversation avoidance and their index score was 12. 39 (1.7%) of them had a great deal of pain, worry and conversation avoidance most of the time and their index score was 3. For different educational levels, HIS scores are seen in table 4 and figure 1. 30.5% of the volunteers who said I had felt a great deal of pain had index score of 3. 26.6%, 22.7%, 14.8%, 3.1%, 2.3% of them had index scores of 4.5, 6.7 and 8 respectively. Decreasing pain sensation caused the raising of the index score values.

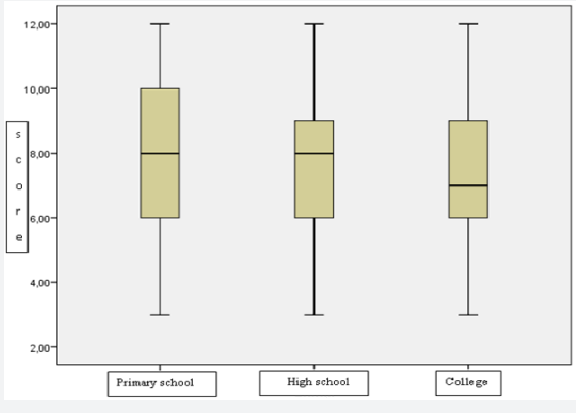

Fig. 1. Relationship of the education level and index score

4. Discussion

Dental surveys of army recruits are an excellent model for the dental status of young people in Turkey since this age group is sufficiently heterogeneous to represent Turkish youth. There is a lack of data about young population's oral health status living in Turkey. Turkey is developing with high young population so it can be considered that young population's oral health status should be observed in every respect. For this purpose, in the present study, OHRQOL and other parameters related with oral health were investigated. This research focused on three dental health questions that were asked of participants in the Rand Health Insurance Study. Although it is unlikely that three items will comprehensively assess the psychological and social impact of dental conditions, the questions addressed major consequences of dental disease, namely pain and distress, worry or concern, and reduced social interactions. Considering the concept of health and its application in dentistry, there is now substantial literature which are discussing different approaches and conceptual frameworks (Reisine, 1981; Locker, 1988; Gift and Redford, 1992; Coulter et al., 1994) On the other hand, because of the volunteers varying education levels and having different ethnic identities and culture, three HIS questions which are short and straightforward were preferred. In general, different concepts for OHRQOL were developed for industrialized and developed countries but no specific epidemiologic study was performed to find out the appropriate method for Anatolian and Middle East people. In parallel to this Locker stated that; methods for measurement of the health and the quality of life may vary according to the social, cultural, political and practical contexts in which the concepts are being operationalized and measured (Locker, 1997). Data from the Rand Health Insurance Experiment (HIE) were used in exploratory analyses to examine the associations of self-reported dental health with general health measures by Dolan et al. (1991) and they stated that however, while dental health may be considered an independent health construct, the dental health index was statistically significantly associated with the general health perceptions index. In the present study, 30.8% (a great deal of pain and some pain) of the volunteers affected from pain and distress, 65.7% (a great deal and somewhat) of them had worry or concern about their teeth or other oral structures and 44.7% (most of the time and some of the time) of them had reduced social interactions. Dolan et al. (1991) found for the same parameters 7.8%, 12.9% and

3.6% respectively. In the present study, the young population who effected from pain, worry or reduced social interactions are very high than expected. Contrary to expectations, junior college graduates volunteers exhibited statistically significantly lower median score than primary school graduates volunteers. It could explain that more educated group may have more social concerns and worry about their oral health. In parallel to this, 30% of college, 25% of the high school and 26% of the primary school graduates volunteers had a great deal of worry or concern about their oral health and respectively, 27%, 21%, 20% of them had reduced social interactions most of the time.

This investigation was also concentrated on the occurrence of tooth loss (excluding third molar) in Turkish young population. In the present study, the number of remaining teeth of Turkish young population was 27.2 and this value was similar for the Swedish young population in 1973, whereas in 2003 the mean number of Swedish young population's teeth was 27.4 and approximately 27 in all groups of 15, 20, 30 and 40-year-old dentate subjects; the number only became lower above the age of 50 and fell to 18 at age 80 (Hugoson et al., 2005). In a representative sample of 35-44-year olds in a French region, examined in 1994, the mean number of teeth was 27.1, indicating that the great majority had all teeth remaining (Hescot et al., 1997).

Astrom et al. (2005) found the dental attendance frequency in Norwegian adult population that 66.8% of them visited the dentist at least once in a year and 4.1% of them had never gone to a dentist. According to Sheiham et al. (1985) investigation performed in 1985 which was about the dental attendance frequency of population in England, about one-half of the sample saw a dentist every 6 months, but this proportion was as high as three quarters among those who attended on a check-up basis. By contrast, only small minorities of those who saw a dentist only when they have trouble went as often as once a year or once every 2 year; the majority, two-thirds, saw a dentist less frequently.

According to Fernandes et al. (2006) in Scotland only 13% of the people go to dentist when they have pain, acute problem or in trouble and the remaining 87% go to dentist office regularly.

It is clear that when the public health awareness is high, the life quality of the public will increase. In addition to this, in the present study, 812 (35%) volunteers answered" I am disregardful of my oral health and 561 (24.2%) of them answered " I don't know that I should go regularly and moreover 283 (12.2%) recruits answered " I have never gone to a dentist before in my life. This indicates that the importance of oral health is not well understood by young adult community in Turkey. The effects of oral health on general health conditions should be explained to the young population clearly and this matter is under the responsibility of the relevant ministries. Albert (2004) concluded as being supportive this; the quality of health of a nation is a social matter, not just a personal one socially oriented approaches seek to raise public awareness of health hazards, to educate and influence policy makers, to build community capacity to change health policies and practices, and to mobilize the collective citizen action needed to override vested political and economic interests that benefit from existing unhealthful practices.

The weakest measure in this study was the dental health index, containing only three items. It is important to consider that other oral or facial conditions may have associations with personal impact measures and were not part of these analyses. Improved self reported measures of dental health status, studied in association with other general health measures, will allow us to better define oral health, and patient's perception of oral health, particularly in relation to other general health perceptions.

In addition to this, it is important to determine the mean number of missing teeth of Turkish society not only for young adult population but also for 30-40 year-old or older groups both male and females and the absence of DMFT index and radiographic evaluation for young adult population is the significant lack of the present study. Different index or questionnaires for measuring the OHRQOL should be performed for the young adult population.

With the limitations of the present study, it can be concluded that effect of oral health status on an individual's life quality is not well known by Turkish young population. Inadequate dental attendance frequency of the community may be significant obstacle for the development of sufficient oral health status.

REFERENCES

Astrom, A.N., Haugejorden, O., Skaret, E., Trovik, T.A., Klock, K.S., 2005. Oral impacts on daily performance in Norwegian adults: validity, reliability and prevalence estimates. Eur. J. Oral. Sci. 113, 289-296. doi: 10.1111/j.1600-0722.2005.00225.x.

Bandura, A., 2004. Health promotion by social cognitive means. Health Educ. Behav. 33, 143-164. doi: 10.1177/1090198104263660.

Brook, R.H., Ware, J.E., Davies-Avery, A., Stewart, A.L., Donald, C.A., Rogers, W.H., Williams, K.N., Johnston, S.A., 1979. Overview of adult health status measures fielded in Rand's Health Insurance Study. Med. Care. 17, 1-131.

Bullock, C., Boath, E., Lewis, M., Gardam, K., Croft, P., 2001. A case-control study of differences between regular and casual adult attenders in general dental practice. Prim. Dent. Care. 8, 35-40. doi: http://dx.doi.org/10.1308/135576101771799407.

Coulter, I., Marcus, M., Atchison, K., 1994. Measuring oral health status: Theoreticaland methodological challenges. Soc. Sci. Med. 38, 1531-1541. doi: 10.1016/0277-9536(94)90115-5.

Cushing, A.M., Sheiam, A., Maizels, J., 1985. Developing socio-dental indicators-The social impact of dental disease. Community. Dent. Health. 3, 3-17.

Dolan, T.A., Goocli, Hi., Bourque, L.B., 1991. Associations of self-reported dental health and general heallh measures in the Rand Health Insurance Experiment. Community Dent. Oral. Epidemiol. 19, 1-8. doi: 10.1111/j.1600-0528.1991.tb00095.x.

Fernandes, M.J., Ruta, D.A., Ogden, G.R., Pitts, N.B., Ogstone, S.A., 20066. Assessing oral health-related quality of life in general dental practice in Scotland: Validation of the OHIP-14. Community Dent.Oral.Epidemiol, 2006. 34, 53-62. doi: 10.1111/j.1600-0528.2006.00254.x.

Gift, H., Redford, M., 1992. Oral health and the quality of life. Clin. Geriatr. Med. 8, 673-683.

Hescot, P., Bourgeois, D., Doury, J., 1997. Oral health in 35-44 year old adults in France. Int. Dent. J. 47, 94-99. doi: 10.1111/j.1875-595X.1997.tb00682.x.

Hopcraft, M., Morgan, M., 2003. Dental caries experience in a young adult military population. Australian Dent. J. 48, 125-129. doi: 10.1111/

j.1834-7819.2003.tb00021.x.
Hugoson, A., Koch, G., Gothberg, C., Helkimo, A.N., Lundin, S.A., Norderyd, O., Sjödin, B., Sondell, K., 2005. Oral health of individuals aged 3-80 years in Jonkoping, Sweden during 30 years (1973-2003). II. Review of clinical and radiographic findings. Swed. Dent. J. 29, 139-155.
Locker, D., 1988. Measuring oral health: A conceptual framework. Community. Dent. Health. 5, 3-18.
Locker, D., 1997. Concepts of oral health disease and quality of life, Slade GD (Ed). Measuring oral health and quality of life. Chapel Hill, NC: University of North Carolina, Department of Dental Ecology, 11-25.
Locker, D., Gruska, M., 1987. The impact of dental and facial pain. J. Dent. Res. 66, 1414-1417. doi:10.1177/00220345870660090101.
Reisine, S., 1981. Theoretical considerations in formulating socio-dental indicators. Soc. Sci. Med. A. 15, 745-750. doi: 10.1016/0271-7123(81)90018-3.
Richards, W., Scourfield, S., 1996. Oral ill-health in a general dental practice in South Wales. Primary Dent. Care. 3, 6-13. doi: 10.1308/135576102322492972.
Rosenberg, D., Kaplan, S., Senie, R., Badner, V., 1988. Relationships among denial functional status, clinical dental measures, and generic health measures. J. Dent. Educ. 52, 653-657.
Salzmann, J.A., 1969. Orthodontic parameter for epidemiologic determination. Am. J. Orthod. 55, 103-104.
Sheiham, A., Maizels, J., Cushing, A., Holmes, J., 1985. Dental attendance and dental status: Dental attendance and dental status. Community Dent. Oral. Epidemiol. 13, 304-309.
Todd, J.E., Walker, A.M., 1980. Adult dental health. England and Wales 1968-1978 Social Survey Division, London. pp. 1, 116.
Yewe-Dwyer, M., 1993. The definition of oral health. Brit. Dent. J. 174, 224-225. doi: 10.1038/sj.bdj.4808131.